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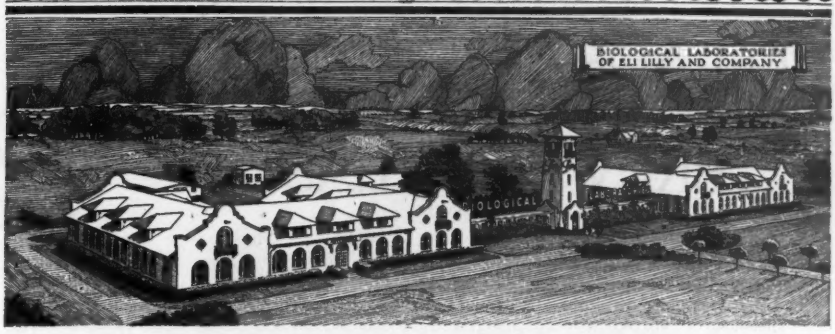

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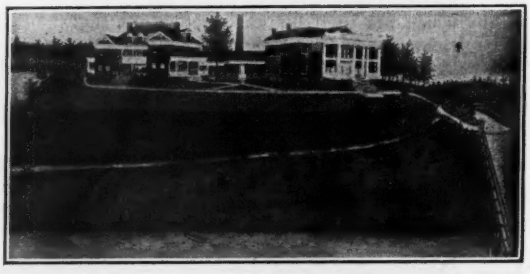

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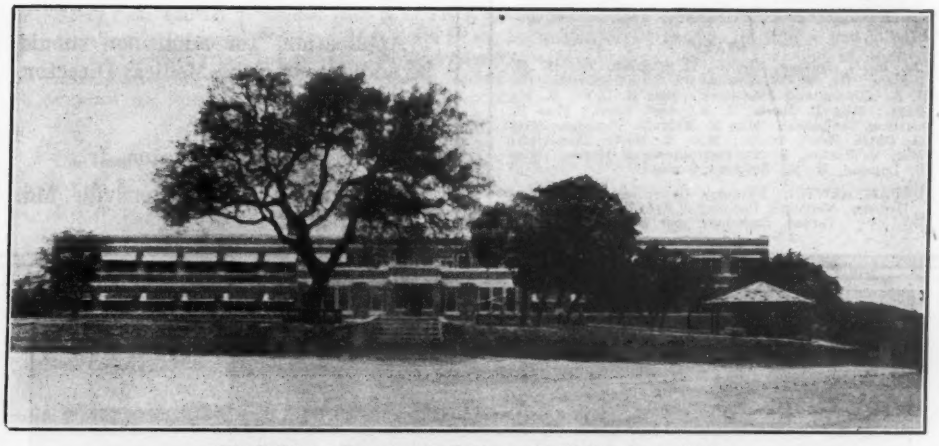

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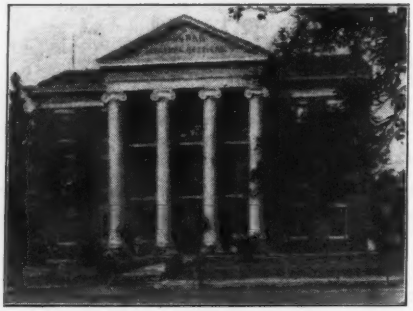

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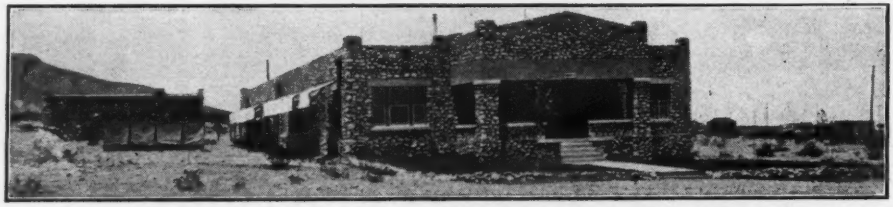

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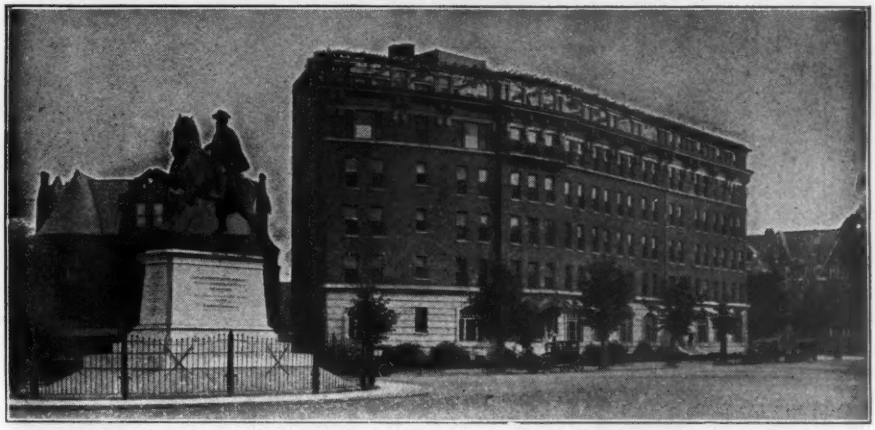

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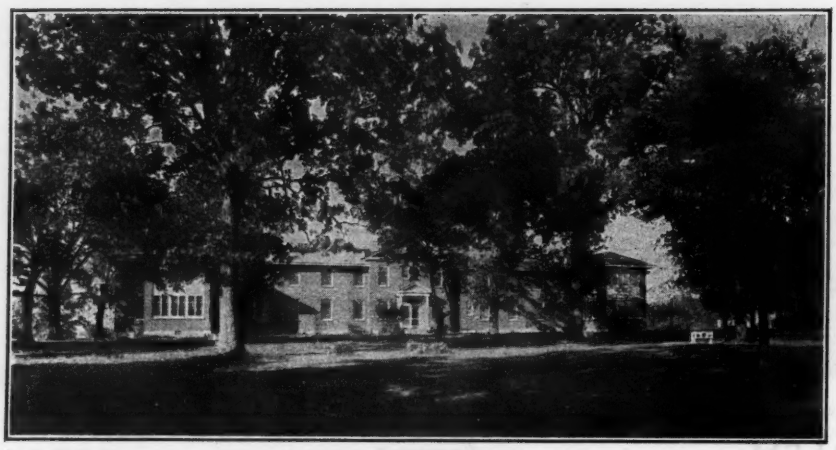

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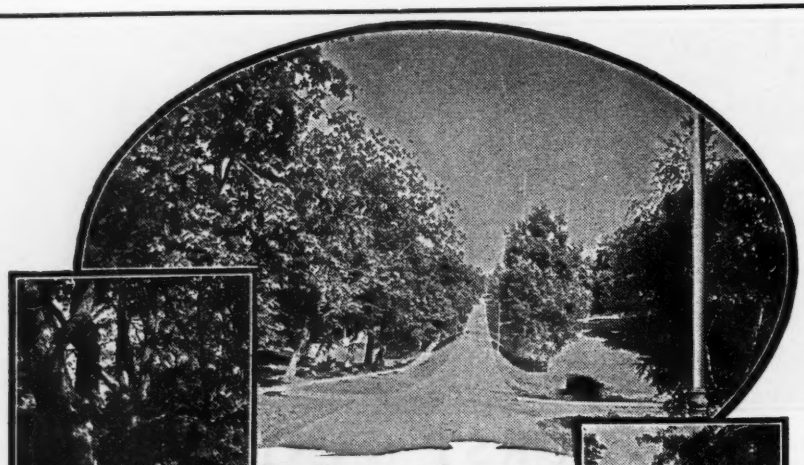

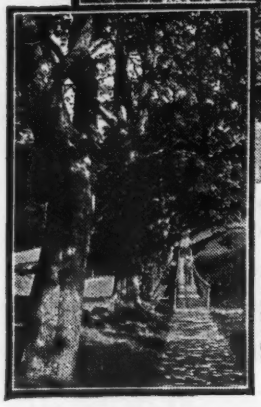

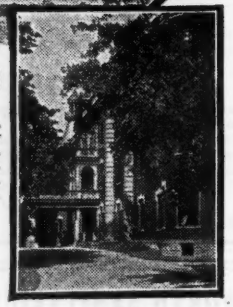

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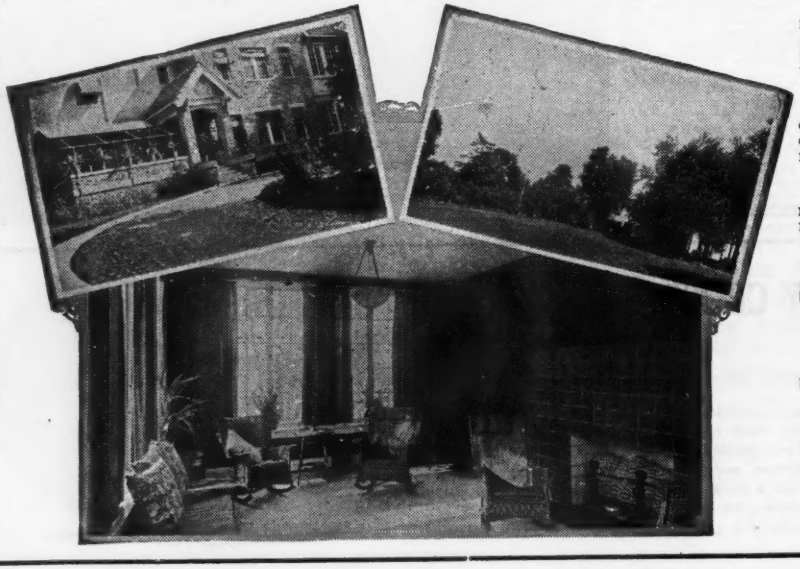

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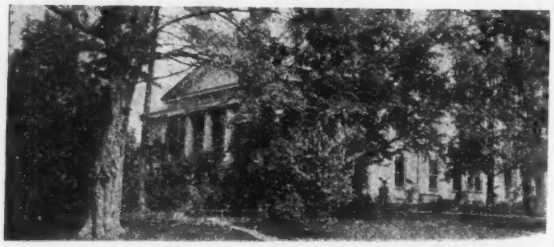

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MEDICINE

INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

NECROPSY FINDINGS IN DIABETES*†

By RUSSELL M. WILDER, M.D.,
Rochester, Minn.

This report is based on the pathologic conditions found in eighty-one fatal cases of diabetes in which treatment had been given in the hospitals connected with the Mayo Clinic in a six-year period closing October 1, 1925. These cases represent all the deaths occurring in 2,469 cases of diabetes admitted to hospitals. Thirty-three deaths followed operations. The average age of death of the eighty-one patients was 54.9 years. The individual ages ranged from one to seventy-eight years; in 87 per cent the age was more than forty, and in 73 per cent more than fifty. Diabetic coma was the cause of death in nineteen cases without operation and in four cases following operation. Since the introduction of insulin in July, 1922, only four patients have died from diabetic coma and none from coma following operation. Gangrene, with or without coma, was responsible for fourteen deaths.

Permission to perform necropsy was withheld in twenty-three of the eighty-one cases. Permission for partial necropsy was granted in seven cases, and for complete necropsy in fifty-one cases. The pancreas was examined microscopically in fifty-five cases.

As has been so generally true of other series of diabetes, there is evidence in the majority of these cases of pre-existing obesity. In taking the history an effort has been made to obtain a statement as to the maximal body weight prior to the onset of diabetes. Height and maximal weight were recorded in sixty-one of the eighty-one cases, and in thirty of these (almost 50 per cent) the weight had been 20 per cent or more in excess of the average for normal persons, as given in actuarial statistics. On the other hand, in twelve cases (20 per cent) the maximal weight was subnormal.

The duration of diabetes, as estimated from the date of the appearance of definite diabetic symptoms, admittedly inexact, varied from a few days to twenty years. Only one case extended over twenty years. In twelve cases diabetic symptoms or glycosuria had been present longer than ten years, and in twenty-four, longer than five years.

The majority of these patients, therefore, were obese, more than fifty years of age, with diabetes of insidious onset and chronic course which terminated from some degenerative complication or from operation rather than from diabetes.

In the entire series of 81 cases, uncomplicated diabetes was responsible for death in only ten (12 per cent). In six of these necropsy was performed. The degree of pancreatic damage in three was trivial. In the others there was extensive diffuse sclerosis of the pancreas with atrophy (Table 1). It is noteworthy that the patients with uncomplicated diabetes are not overweight.

Gallstones were found at necropsy in sixteen of fifty-eight cases (Table 2), and severe cholecystitis without stones in four others. In the cases with gallstones hyalinization of the islands occurred in three, and marked sclerosis of the islands in three. Interlobular fibrosis and acinous sclerosis were more common than insular

*From the Division of Medicine, Mayo Clinic.

†Read in Section on Medicine, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

TABLE 1
Death Due to Uncomplicated Diabetes (coma)

Case	Age and sex	Duration of diabetes, months	Carbon dioxid combining power	Pancreas							Other lesions
				Gross appearance	Islands				Acinous		
					Number	Sclerosis	Hyalin	Lymphocytes	Sclerosis	Lymphocytes	
1	44 F	28		No note	Numerous	3*	1	1	1	0	Chronic nephritis
2	23 F	12	9	Small	Numerous	0	0	0	0	0	None
3	25 M	2	14	Normal size	Few	0	0	0	0	1	None
4	45 M	3		Small, firm	None				4	0	None
5	49 F	6	18	No gross lesions, weight, 45 gm.	Few	0	0	0	1	0	Exophthalmic goiter?
6	61 M	1	14	Atrophy, weight, 45 gm.	Numerous	2	1	1	2	1	Arterio-sclerosis 2
No Necropsy											
7	36 F	24	10								Obesity, loss of 100 pounds
8	1.5 M	1									
9	7 F	18	14								
10	34 M	12									

*On a scale of 1 to 4.

sclerosis. In three cases the pancreas was but little affected. Ten of these sixteen patients were males. This incidence of cholelithiasis, startling though it is and comparable to that reported recently by Warren and Root, is no higher than the incidence of gallstones occurring in the population at large, to judge from the general run of necropsy material recently reviewed in this clinic. I still believe, however, that the presence of diabetes, no matter how trivial, should be regarded as a diagnostic criterion of considerable importance in cases of suspected cholecystitis, and that disease of the gallbladder is an etiologic factor of importance in diabetes.

Pancreatic stones were found in three cases (Table 3). The first of these (Case 1, Table 3) showed hemochromatosis of the skin and bronzed cirrhosis of the liver. The pancreas in this case was almost destroyed by fibrosis and fat replacement. No insular tissue and very few acini could be demonstrated in it. In the second case (Case 2, Table 3) gallstones were associated. The pancreatic fibrosis here was chiefly interlobular and, while the organ as a whole was greatly reduced in size, the insular tissue was abundant, suggesting hyperplasia. In the third case the destruction of the pancreas was nearly complete.

The extrahepatic lesions in cases of diabetes, aside from the high incidence of gall stones, are mainly referable to the cardiovascular system. Atherosclerosis, sufficient in degree to be graded 2 or more, on a scale of 1 to 4, is noted in the necropsy reports of forty-one of the fifty-one cases in which the condition of the arteries is recorded. Sclerosis of the kidneys occurred in fourteen cases (26 per cent), while chronic diffuse nephritis occurred in four other cases.

Gangrene was directly or indirectly responsible for fourteen of the eighty-one deaths. Both the very fat and the very lean were represented. Fat persons predominated, but I do not get the impression, contrary to that given by Warren and Root's recent report, that obesity is an important factor. In eight of these cases necropsy was performed. Gallstones were found in five of them. Marked and generalized atherosclerosis occurred in all. Marked coronary sclerosis and myocardial damage were found in six, and moderate coronary sclerosis in the remainder. This is particularly noteworthy and should be taken into account in evaluating the risk attending operation. In other words, it means that in all cases with gangrene there is serious sclerosis of the coronary arteries, and that very great coronary sclerosis and myocardial damage are present in three out of every four of them.

In most of the cases with gangrene, necropsy revealed extensive sclerosis and hyaline lesions in the pancreas, but there was one notable exception (Case 6, Table 2).

In this case the pancreas was practically normal, although the arteries of the extremities and those of the heart and brain showed extreme atherosclerosis. This patient had been admitted to a surgical service in an agonal condition and died a few hours later in what was called diabetic coma. Sugar was found in the urine, but no determination of blood sugar was made and no history could be obtained. Incidentally, the galbladder contained stones, which made the absence of demonstrable pathologic lesions still more unusual.

The ages of the patients with gangrene varied from thirty-nine to seventy-five years, and averaged fifty-nine years. This is significant because persons without diabetes rarely show this degree of atherosclerosis and almost never develop gangrene of the extremities under the age of seventy, except in the presence of thrombo-angiitis or thrombosis.

A high incidence of sclerotic changes in the coronary arteries was found not only in the patients with gangrene, but also in seventeen (34 per cent) of the forty-nine cases in which the heart was examined at necropsy. The pathologist in each instance graded it as 3 or 4. In nearly all of these cases the heart showed gross myocardinal damage, but in most of them symptoms of angina pectoris had not been noted during life.

Again, I am not impressed, contrary to Warren and Root's report, with the etiologic importance of obesity in this group with coronary sclerosis. Both lean and fat persons were represented.

A small but interesting group is that of the patients who suffered from goiter besides diabetes. There were nine of these. Four had exophthalmic goiter and the remainder adenomatous thyroid without hyperthyroidism. In the four cases of exophthalmic goiter diabetes was of considerable intensity.

In one case (Case 2, Table 2) diabetes had been mild for six years and had been controlled adequately by moderate restriction of food until the onset of hyperthyroidism. Thereafter it was impossible to control acidosis, and death resulted from this as well as from progressive heart failure. The presence of symptomless gallstones had been diagnosed during life, and was confirmed at necropsy. The small hard pancreas showed considerable interlobular fibrosis and slight sclerosis of the islands.

In one case (Case 1, Table 2) in which diabetes had lasted only seven months, and symptoms of exophthalmic goiter had extended over several years, thyroidectomy was performed, and the patient died shortly afterward from pneumonia. Although gallstones were found at necropsy, the pancreas in this case showed "slight atrophy" and "few islands," but otherwise nothing definitely abnormal.

In one case (Case 5, Table 1) diabetic coma and death occurred one hour after the institution of insulin treatment. Diabetic symptoms had been present six months. The diagnosis of exophthalmic goiter was made at necropsy from the appearance of the thyroid. The pancreas showed nothing abnormal either macroscopically or microscopically.

In one case (Case 4, Table 1) thyroidectomy was performed for exophthalmic goiter three months before death. Diabetic symptoms developed soon after operation. In this case the pancreas showed extreme fibrosis and atrophy.

DISCUSSION

Mention of hydropic degeneration of the insular cells has been omitted for two reasons: because it has not been identified in my material, possibly because this was not perfectly fixed, and because its occurrence in the pancreas of man, as reported by others, is extremely rare and seems to be of doubtful significance. This condition was first described by Weichselbaum in 1910, and is considered by Allen and by Homans to be the only anatomic change pathognomonic of diabetes. According to Allen, it is a constant occurrence in the pancreatic remnants of partially depancreatized dogs, but Allen identified it with certainty in only three pancreas from a series of nineteen cases of diabetes. He was led to diagnose diabetes erroneously from a study of the pancreas in twenty-four out of 549 non-diabetic cases, owing to postmortem changes somewhat resembling vacuolization of insular cells. Conroy, in twelve cases of diabetes, found only one instance in which the lesion was sufficiently definite to be recognized. In one other case there were occasional hydropic cells in the islands, but as a similar appearance was noted in several cases in the absence of diabetes, no significance was attached to this.

Allen would expect to find hydropic degeneration only in rapidly progressing cases with intense symptoms but, in any event, he and others agree that this lesion is a result of uncontrolled diabetes and not a cause, an indication of the harm wrought by improper treatment rather than a feature of etiologic significance.

Another lesion, to which Dogiel first called attention in 1893, is the presence of stainable lipoids in the pancreatic islands. This has received relatively little consideration and possibly deserves more. Weichselbaum and Stangl noted it in a number of cases of diabetes, but owing to its considerable, although less extensive, occurrence in the acini and islands of persons without diabetes, they attached little significance to it and considered that it represented probably a

TABLE 2
Cases with Gallstones*

Case	Age and sex	Duration of diabetes, years	Gallbladder disease diagnosed during life	Cause of death	Pancreas: Islands: Number	Islands: Sclerosis	Islands: Hyalin	Islands: Lymphocytes	Acinous: Sclerosis	Acinous: Lymphocytes	Other lesions	Overweight per cent
1	37 M	7 months	—	Postoperative Pneumonia Thyroidectomy for exophthalmic goiter	Few	0	0	0	0	0	None	17.6
2	44 F	6 2/3	+	Exophthalmic goiter	Numerous	1	0	0	1	0	None	33.7
3	57 F	2 months	—	Diabetic coma		0	0	1	2	0	None	
4	45 F	1½	+	Postoperative cholecystectomy	Few	2	0	1	2	1	Chronic nephritis	40.4
5	63 M	5 1/6	—	Septicemia		1	0	0	1	0	Coronary sclerosis Gangrene of left leg	38.0
6	65 M	?	—	Diabetic coma	Numerous	0	0	0	1	0	Coronary sclerosis Gangrene of right foot	
7	63 M	16	—	Septicemia		2	0	0	2	0	Hepatitis. Chronic nephritis. Gangrene of right foot	61.0
8	51 F	10	+	Pyelonephritis	Numerous	2	0	0	2	0	Arteriosclerosis Pyelonephritis	67.0
9	76 M	15	—	Pneumonia	Numerous	1	0	0	2	0	Coronary sclerosis Chronic nephritis	31.9
10	75 M	4	—	Pneumonia	Numerous	2	2	0	2	0	Coronary sclerosis Gangrene of left foot	
11	57 M	7	—	Infected hemorrhoids Peritonitis		1	1	0	2	0	Cirrhosis of liver	—3
12	54 F	1	+	Postoperative tonsillectomy. Endocarditis	Numerous	0	0	0	2	0	Subacute endocarditis	39.5
13	49 F	15	—	Diabetic coma	Numerous	2	4	1	3	0	Arteriosclerosis	—7
14	65 M	14	—	Postoperative cholecystostomy Carcinoma of splenic flexure	Numerous	0	0	0	3	0	Coronary sclerosis Arteriosclerosis	36.9
15	45 M	9	+	Septicemia	Numerous	1	0	0	3	0	Coronary sclerosis Gangrene of right leg	—50
16	70 M	6 months	—	Arteriosclerosis	None				4	0	Coronary sclerosis Aneurysm of abdomen and aorta.	12.4

*Gallstones found in sixteen of fifty-eight necropsies, 28 per cent. Frequent association of other lesions: obesity in eight, coronary sclerosis in seven, gangrene in five.

result rather than a cause of diabetes. Symmers noted the conditions in twenty-four of thirty-two alcoholic habitues who did not have diabetes, but found no lipoids, or insignificant amounts of it in forty-one persons who did not use alcohol, two of whom suffered from advanced diabetes.

In my series I was considerably impressed by the rather large number of sections which showed a very striking staining of the islands with scarlet R., this being due to the presence in the insular cells of large numbers of very small deeply staining droplets. Sections stained with hematoxylin and eosin fail to show the slightest change in these cells. There were eleven cases in this series which showed this phenomenon strikingly, and in some of them, it was practically the only unusual or abnormal feature of the pancreas. In fifteen other cases smaller amounts of the fat-staining droplets occurred. In a large series of sections of the pancreas in cases without diabetes, the same appearance was noticeable in a few. The phenomenon is certainly more common with diabetes. I do not attach any more importance to this observation than did Weichselbaum and Stangl, and regard it as probably a result and not a cause.

Figures 1 and 2 show great destruction of the pancreas in a case of pancreatic lithiasis (Case 3, Table 3). The organ is practically entirely replaced by scar tissue which is so shrunken that it is impossible to recognize grossly any pancreatic tissue. Sections made at numerous levels reveal nothing but scar tissue except that in the region of the tail there appear one small mass of acinous tissue, a few ductules, and a very few small areas that suggest islands, but cannot be positively identified as such and may represent involuted acini (Fig. 2). These are the results of a process similar

TABLE 3
Cases with Pancreatic Stones

Case	Age, Sex	Duration of diabetes, years	Height		Maximal weight, pounds	Final weight ponds	Steatorrhea	Pancreas							Other Lesions
								Gross appearance	Islands				Acinous		
			Feet	Inches					Number	Sclerosis	Hyalin	Lymphocytes	Sclerosis	Lymphocytes	
1	53 M	4	5	9	170	122	+	Multiple calculi Bronze cirrhosis	None				3	0	Bronze cirrhosis of liver
2	45 M	9	5	5¾	?	75	+	Great atrophy	Numerous	1	0	0	3	0	Gallstones
3	55 M	2	5	7	195	110	+	Extensive Fibrosis	Very Few				4	2	Cholecystitis

Diabetes very easily controlled in all cases. Any one of the cases could have been taken care of without insulin, and the first received no insulin. Malnutrition, the result of the digestive disturbance was in part responsible for the good tolerance exhibited, but by no means accounts for it entirely. Case 2 with numerous islands had suffered much more emaciation than the others and was the most severely diabetic.

to that initiated by experimental ligation of the pancreatic ducts, although, contrary to the usual experience, acinous tissue has not entirely disappeared. Certain findings of Clark, recently referred to by Bensley, indicate that acinous tissue may be preserved for a long time after obliteration of the duct. As Bensley remarked, it is fortunate that Banting did not know this, since his early research was based on the contrary idea.

From the degree of destruction of this pancreas, the existence of diabetes during life is to be presumed. The amount of insular tissue left is certainly much less than one-tenth of the normal complement, which from animal experimentation is the minimal amount necessary to prevent diabetes. As a matter of fact, the patient did have diabetes, but so mild that a regimen of 1800 calories with a glucose equivalent of 90 gm., combined with three doses of 10 units of insulin each, sufficed to clear the urine of sugar in twenty-four hours. The patient was fifty-five years of age and had had symptoms of diabetes for two years without previous treatment. The subsequent hospital course was that of a very mild case of diabetes. With 24 units of insulin a day, a diet of 2000 calories and a glucose equivalent of 140 gm. could be given without the blood sugar's being raised above normal. It is believed that the diet could have been tolerated without insulin. Insulin was given for the reason that the patient was being prepared for operation. Cholecystitis with lithiasis was suspected and the patient was explored surgically. Subsequently, pneumonia developed and proved fatal.

A case recently reported by Boyd and Robinson may be compared with this case. The patient was a child aged nine, and had had diabetes from the age of two. He was barely kept alive for four years by an Allen diet. Then the availability of insulin made it possible to nourish him up to a condition approximately normal for his age. His tolerance for carbohydrates increased as he gained in size, and finally he could assimilate 45 gm. of carbohydrates without insulin. This tolerance is low; hence his diabetes remained fundamentally severe to the end. He met with a serious accident and died in about three hours. Necropsy was performed immediately.

The pancreas, as described by Boyd and Robinson, was morphologically nearly normal. The islets were numerous and some were quite large. They were fairly uniformly distributed throughout the whole pancreas, being especially numerous in certain peripheral areas. Boyd and Robinson were impressed with evidence which points to new formation of insular tissue. From this they presume that the organ had previously degenerated and was subsequently restored by insulin. However, the child's entire body was growing extremely rapidly, owing to the removal of the brake which had held it back, and it is scarcely surprising to find the islands participating in such growth. There is certainly nothing in these findings which proves that the pancreas had ever been seriously damaged.

For further comparison with the case of pancreatic lithiasis, two of this series (Case 2 and 3, Table 1) are cited. The patients were young, aged twenty-five and twenty-three, the former with intense diabetes of two months' duration, and the latter with diabetes of a year's duration. Both cases terminated in diabetic coma without other complications. Neither patient had had treatment. The pancreas in the first case (Case 3, Table 1) was normal in size and consistency and, while the islands in the few sections available for study appeared few in number, they were numerous in comparison with those in the pancreas showing lithiasis. The pancreas in the second case (Case 2, Table 1) was both macroscopically and microscopically normal. Hydropic degeneration could not be demonstrated owing

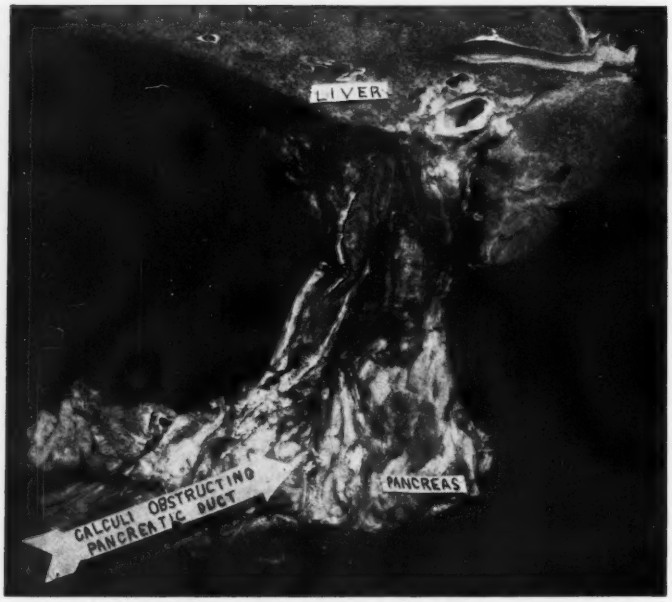

Fig. 1. Pancreas almost completely replaced by connective tissue, in a patient with pancreatic stones.

possibly to faulty fixation. Necropsy in the first case was performed thirty minutes after death.

Here, in a nutshell, is the difficulty with the pancreatic theory of diabetes. Such incongruities between the severity of diabetes and the presenting pathologic anatomy of the pancreas are the rule, not the exception, as has been known for years. Karakascheff, for example, was unable to find sufficient change in the pancreas to account for the existence of diabetes in eleven cases of diabetes, in four of which death followed coma. Hansemann reported four cases in which the pancreas had been entirely replaced by tumor tissue without the occurrence of glycosuria and, after studying a series of forty-five pancreas from cases of diabetes, he concluded that the islands of Langerhans "have nothing to do with the production of diabetes or that at most their connection therewith is very remote." An extreme position such as that taken by Hansemann is untenable in view of the frequency of lesions in the pancreas in the large majority of the cases of diabetes in its more chronic form, and particularly in view of the well-known effect of experimental ablation of the pancreas. Nevertheless, the occurrence of diabetes, and particularly the occurrence of the most severe forms of diabetes, cannot always be accounted for on the basis of pancreatic lesions alone, and according to Seyfarth and others, practically all the pancreatic lesions found in diabetes can be duplicated in nondiabetic persons.

It is unnecessary to abandon belief in the unitarianism of diabetes in order to look beyond the pancreas for the ultimate cause of the disease. Naunyn made this clear, and Naunyn's views of the nature of diabetes are being tremendously strengthened by recent research in insulin.

According to Naunyn, diabetes occurs in persons with an inherited predisposition thereto. If this predisposition is very strong, the ordinary metabolic strains of a normal life are sufficient to break down the power to utilize glucose. If the predisposition is weaker, diabetes will become manifest as the result of abnormal metabolic strains, such as those produced by excessive eating, or are the sequel to lesions which incapacitate the pancreas. The power to utilize carbohydrates resides in all the tissues, but this power is reinforced by the pancreas. In the absence of the diabetic predisposition, the pancreas may be largely destroyed without provoking diabetes, provided this is done gradually, or if diabetes occurs at all as in the cases of pancreatic lithiasis (Table 3), it is mild. In the presence of the predisposition, lesions of the pancreas produce diabetes, the intensity of which will depend on the degree of predisposition. Heredity has been demonstrated in about 20 per cent of the cases of diabetes, but it is generally admitted that if more careful investigation could be made of supposedly normal persons, much diabetes would be brought to light which remains occult.

Now if for Naunyn's more general phrase, "ability to utilize carbohydrates," the phrase, "capacity to make insulin" is substituted, the old theory is revived and clarified. The ability

Fig. 2. Showing in the mass of scar tissue a small area of preserved acinous tissue, normal in appearance.

to make insulin, or an insulin-like catalyst, and thereby to utilize carbohydrates, is a universal function of living cells. In the body of vertebrates the cells of muscle, liver and other tissues retain this power, but it is rudimentary. The pancreatic islands are differentiated to serve as a special source of insulin. The pancreas (islands?) provides the means whereby the organism can dispose of its carbohydrate food at more rapid rates and thus maintain a life of greater intensity than would otherwise be possible.

Best, Smith and Scott subscribe to this hypothesis, having come to it in consequence of the demonstration by themselves and others,[7 12 14 18 23] of insulin-like material in yeast, plant cells, bacteria, and various animal tissues not excluding the tissues of depancreatized animals. According to Best, considerably more insulin can be extracted from the total mass of muscle of an animal than from its pancreas.

There is a striking difference clinically between the acute progressive type of diabetes, as observed especially in the young, and the chronic types of the disease occurring usually in older persons.[22] The two conditions seem as unlike as separate disease entities, and possibly as evidence is accumulated one will come to regard the former as a disturbance which affects the insulin-making power universally and to see in the latter the limited effect of disease of the pancreas. In disease limited to the pancreas, provided the other body cells remain normal, the organism is not so severely diabetic and may be said to suffer a grade of alimentary glycosuria. In this pancreatic form of diabetes, the general tissues retain their ability to utilize reasonable amounts of glucose provided this reaches them at a slow, regular rate, but are unable to dispose of the sudden plethora of sugar that comes after meals when the demand for insulin exceeds their ability to supply it.

A sudden ablation of the pancreas as practiced in experiments, or a rapid destruction, provokes the most severe diabetes because no time is allowed for necessary readjustments. A more gradual diminution of pancreatic tissue, such as occurs clinically in cases of pancreatitis or insular hyalinization, causes diabetes of a much milder nature, or none at all, depending on the degree of predisposition to diabetes. According to this hypothesis, the pancreas serves as an auxiliary metabolic mechanism, just as the thyroid does. Thyroxin, the product of the thyroid, maintains the metabolic rate at what is considered to be normal. However, in cases of myxedema, or after complete destruction of the thyroid, heat production does not cease. The metabolic rate declines 40 per cent, more or less, but energy exchanges continue uninterruptedly at the lower rate, maintained without doubt by some thyroxin-like hormone elaborated by the tissues.

SUMMARY

An analysis is presented of the pathologic conditions found in a group of eighty-one fatal cases of diabetes. Diabetes was solely and directly responsible for death in ten cases, death in the remainder being due to degenerative complications or to the consequences of operations. Necropsy was performed in fifty-eight cases.

Gallstones were found in sixteen of the fifty-eight cases at necropsy. Pancreatic stones were found in three cases. Sclerosis of the kidneys occurred in fourteen instances, and chronic diffuse nephritis in four.

Arteriosclerosis of considerable degree occurred in nearly all cases when the age of the patient exceeded forty years.

Gangrene accounted for fourteen of the eighty-one deaths and was associated with a high degree of coronary sclerosis and myocardial damage in 75 per cent of cases in which the heart was examined at necropsy.

A very high incidence of advanced coronary sclerosis was encountered in the series as a whole (seventeen cases among fifty-eight), associated usually with marked fibrosis of the myocardium.

In four cases exophthalmic goiter and diabetes were combined. In two of them the pancreas revealed little or no anatomic abnormality.

Hydropic degeneration was not recognized, but marked fatty changes in the islands occurred in eleven cases.

In several cases, representing the most severe and intensive instances of diabetes in the series, the pancreatic lesions were trivial. On the other hand, severe pancreatic lesions were frequently found in cases of relatively mild diabetes in which death was due to degenerative complications.

A parallelism between the degree of parenchymatous changes and the intensity of the clinical symptoms of diabetes does not exist. The explanation of the cause of diabetes must involve considerations such as heredity of predisposition and ability of cells other than those of the pancreas to elaborate insulin.

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Discussion follows paper of Dr. Geddes, page 252.

COMPLICATIONS OF DIABETES*

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Diabetes has been adequately termed a great "liar" because the conditions associated with it are often times baffling and other diseases believed to exist are in reality evidences of the changes produced in the system by the diabetes. Such conditions as pruritus and other affections of the skin, impaired vision, neuritis and rheumatism, are often greatly improved or disappear when the diabetes is controlled. Frequently these are responsible for the diabetes' being recognized. Some complications and intercurrent diseases are of very serious import and frequently cause death, not so much on account of their serious nature as because they aggravate the diabetes and thus produce a vicious circle. Diabetics should be kept under constant supervision, to avoid complications. The patients should be instructed if anything unusual occurs to report immediately to a physician and receive treatment, diet, proper dosage of insulin and surgical intervention, if this is necessary.

INFECTIONS

Infections as complications of diabetes are most frequently encountered. Any infection, even of a mild type, is serious because it will lower the tolerance and aggravate the diabetes if it is not properly treated.

(1) *Pulmonary and Associated Infections*: (*A*) Pneumonia has a high mortality. I have seen five cases of coma precipitated by pneumonia, only one of which recovered.

A child, (F. N.), 11 years old, was brought to the Toronto Clinic in severe acidosis with on-coming coma. The chest showed pleurisy and a small area of bronchopneumonia. She recovered, but subsequently was a complete diabetic, requiring to be fed and given insulin in large doses every eight hours to prevent severe reactions, and on the least provocation she would develop acidosis.

*Read in Section on Medicine, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

(*B*) *Infections of the Upper Air Passages.*—Diabetics should be warned always to go to bed and call their physician when they contract a cold. A mild infection, if neglected, may easily develop into a serious condition, such as pneumonia, and prove fatal.

A woman, Mrs. B., on the border line of requiring insulin, refused to take it. She was given a diet slightly lower than she really required in order to protect her. She became somewhat careless with her diet because of heavy household responsibilities. She contracted a cold which she neglected. This aggravated the diabetes, which was soon beyond ordinary methods of control. She was not given insulin. Pneumonia developed and she was sent to the hospital. When I saw her she was in coma with double pneumonia and died an hour later. Her life might have been saved had she gone to bed, called her physician and received insulin, proper diet and treatment.

(*C*) *Tuberculosis.*—Joslin[1] reports that this pulmonary infection was formerly responsible for half the deaths in diabetes, but today, in private practice, it seldom occurs. A latent infection may light up after the development of diabetes. Diabetics should be particularly warned against exposure to tuberculosis. Late, well developed cases are very discouraging, early cases are more hopeful. Of four cases that I have seen, one case of the miliary type proved fatal. We have had satisfactory results by treating these cases with large, high fat diets of 2500 to 3500 calories, with ketogenic antiketogenic ratio not exceeding 1.7 to 1. The fat is given largely in the form of butter fat containing vitamin A.

One case (M. D.), as soon as he was placed on such a diet, began to improve. He has had no activity of symptoms for three years and is now healthy, strong and attending to his business. Another case, (Miss L.) had extensive involvement of the upper right lobe, the usual symptoms with extreme loss of weight and sputum loaded with bacilli. With complete rest in bed, a diet of 2600 to 3000 calories, and 60 units of insulin a day she made good improvement and her weight was brought up to 15 pounds below normal. She is now in North Carolina and last reports state that the lesion is healing satisfactorily and her diabetes is well under control.

(2) *Foci of Infection.*—While these infections are not so disastrous in their effects, undoubtedly they cause mild diabetics to become worse and severe cases to become dangerous. They prevent improvement in tolerance in a patient under treatment and when the foci are removed there is frequently a remarkable return of tolerance, especially in children.

We had three cases in which the removal of the tonsils in children was followed by remarkable return of tolerance. They were requiring from 60 to 90 units of insulin a day on diets sufficient to permit growth and maintain weight. No return of tolerance, as evidenced by reduction in the dose of insulin, was seen in any of the three over periods of from one to four weeks. Instead, they all showed marked tendency to acidosis. After the removal of the tonsils, the patients were fed liberally with carbohydrate and returned, in from five to seven days, to their former diet, and with a much reduced dose of insulin. One of these (W. H.), a boy of 9 years, requiring 60 units of insulin a day for two months before the removal of the tonsils, was doing without insulin one month after the operation and taking the same diet as before. A second case (Mrs. H. T.), with infected hemorrhoids, required 40 units of insulin a day and showed no improvement on this dose for two weeks, when the hemorrhoids were removed. Ten days later she was taking the same diet as before the operation with less insulin, and six weeks later was doing without insulin on an increased diet.

(3) *Acute Infectious Diseases.*—Children can be safely piloted through these with insulin and proper control of diet.

One case (H. C.), a child of three years, was treated in a hospital for two weeks and his parents were instructed in dieting and insulin. Two months after his return home, he developed in quick succession, measles, mumps, and pertussis. He weathered these successfully under the care of his father. The diseases were of ordinary severity and duration and no complications followed. The intelligent co-operation of his parents undoubtedly saved his life.

(4). *Appendicitis.*—In the acute stage this complication frequently requires immediate surgical intervention. This can safely be done by the co-operation of the surgeon and internist. If the case is urgent, treat the appendicitis first by operation and the acidosis and hyperglycemia immediately following the operation. In cases in which immediate operation is not urgent, time can be taken to clear the patient of ketones and bring the blood sugar within normal range. A few hours of intensive treatment with glucose and insulin, intravenously, will suffice to clear the ketones from the blood.

One case, a boy (A. A.), 17 years of age, developed an acute appendix. The acidosis was under control. He was operated upon under local anesthesia. A ruptured appendix with pus in the abdominal cavity was found. This case made the usual recovery for a patient without diabetes. There is one point worthy of mention. He had a marked tendency after the operation to develop acidosis. He lost ground when this occurred and steadily improved when this was under control.

(5). *Colitis.*—This condition associated with diabetes may interfere with the patient's appetite, the intake of food and the absorption, and so prevent improvement.

In one case (J. B.), aged eight years, there was a mild chronic colitis of five years' duration. It could

not be said with assurance that this was the cause of the diabetes, but it undoubtedly was a factor. He had frequent attacks of nausea, vomiting and loss of appetite and showed no improvement for several months, on a weighed diet with insulin. After careful treatment of the colitis with subsequent care of the lower bowel, this child has grown, increased in weight and strength and is now an average boy, playing and going to school.

(6). *Gall Bladder Infections.*—Joslin reports[10] that gall bladder infections and gallstones are frequently associated with diabetes, invariably precede the diabetes and are undoubtedly a factor in the causation. Cases following gall bladder infection are usually of the milder type. The diabetic condition is usually improved by operation. The operation for drainage or stones can be safely performed.

A young man (A. F.), 20 years of age, was precipitated into coma by cholecystitis and intestinal stasis. The acidosis and symptoms of coma were cleared up by treatment with insulin and glucose. The ketones disappeared from the blood and urine and breathing was normal, but he remained in toxic stupor until the bowels moved after which his improvement was very rapid. The giving of two treatments of glucose and insulin intravenously greatly improved his condition during the toxic stupor and I believe was a factor in establishing elimination through the bowels.

(7) *Skin Affections.*—Pruritus, eczema, urticaria and other skin eruptions due to hyperglycemia are greatly benefited by treatment of the diabetes and lowering of the blood sugar.

Furunculosis requires daily bathing with mild antiseptics, strict aseptic precautions and daily changing of linen and clothing as described by Joslin.[2]

The mortality from carbuncles is high and most physicians prefer to see a diabetic with almost any other infection. Early free incision with free drainage is essential. Excision may be necessary. It is surprising in this way how many cases can be saved. The absorption of toxins from a carbuncle which has not free drainage aggravates the diabetes and usually proves fatal.

Gangrene is a common complication of diabetes, and one of the most serious. If treated early, usually by amputation, the results are hopeful. If late, it is usually fatal. Amputation should be done as early as possible while the patient is in good condition, and should not be delayed until septic absorption with rise in temperature has occurred. Amputation should be sufficiently high up, in the case of the leg, to insure good circulation and healing. It is usually necessary to amputate above the knee. If removal below the knee is attempted, a second operation is frequently required. The majority of these cases have acidosis and this should be cleared up before the operation unless the case is very urgent. Early gangrene in which small areas are involved, the deeper tissues not invaded and the circulation is fairly good, can sometimes be healed without amputation, but under no circumstances should amputation be delayed once it is evident that the gangrenous area is advancing. Buerger's exercises are of great assistance in cases of poor circulation favoring gangrene.

Diarrhea.—This is a complication very difficult to control and requiring great care in treatment if insulin is used. These cases should be treated in a hospital with a nurse acquainted with insulin treatment. Insulin should be given with great caution, as the patient may eat a meal, receive his insulin and the food apparently pass through him with no absorption. The insulin will then produce a severe reaction. The most severe reactions I have seen have been in such cases, in the Toronto Clinic. Of four severe cases that came under my observation, three with very little relief to the diarrhea, died within a short time after leaving the hospital.

Pregnancy.—This is still a somewhat open question as the occurrence of pregnancy in a diabetic patient using insulin is rare.

Pregnancy with diabetes is a serious matter. It adds a heavy load to one who already has as much as she can carry. Many mild cases of diabetes with careful handling go on to successful delivery. Insulin will no doubt greatly lessen the seriousness of this complication.

Arteriosclerosis.—This is common in elderly diabetics. Many such cases seem to do better if allowed to show a trace of sugar in the urine and a somewhat elevated blood sugar. It does not seem that sugar or acid in the urine injures the arteries or kidneys, according to the records of Joslin, Janeway and Elliott.[3] Hence it is very doubtful if diabetes is a direct causative factor of arteriosclerosis. But arteriosclerosis may play an important role in the production of diabetes.[3]

I have seen three cases of this kind who presented an unusual condition. All three were over 70 years of age, with advanced arteriosclerosis. Two had a slight tendency to senile dementia. The third was a paranoid. They appeared to have a fixed dose of insulin and if given a larger dose, irrespective of whether their blood sugar was high, low, or normal, they passed into a state of acute dementia, were quite irrational and controlled with difficulty. These attacks lasted six to ten hours. The condition was unaffected by giving glucose intravenously, and in this

respect, as well as having no relation to the blood sugar level, the attacks were unlike those from hypoglycemia. On recovering from the attack, the patient would usually sleep for from four to six hours and on waking would be in a normal and natural condition with the mind clear. One case (Mr. S., Toronto), was tested three times to see if he could tolerate a dose of insulin over five units, but in each instance he had one of these attacks. One case (Mrs. G.), later developed an increased tolerance to insulin.

Bright's Disease.—We have frequently found albumin in small quantities in the urine of diabetics. This disappeared shortly after treatment was commenced and no further evidences of kidney lesion could be found. Diabetes does not seem to cause Bright's disease, but arteriosclerosis is the underlying cause of both Bright's disease and diabetes in elderly people as referred to by Joslin.[5] I have seen only one case of uremia complicating diabetes and this woman died in coma with an excessively high blood sugar and severe acidosis.

HANDLING OF SURGICAL CASES

If the condition is urgent it is best to perform the operation, and treat the diabetes and acidosis afterward. This is the general opinion expressed by Joslin[9] and Jones, McKittrick and Foot of Boston.[10] Joslin reports only five patients who were operated upon whose blood sugar was high and four of these recovered. In our experience, in all but one case, we were able by intensive treatment with glucose and insulin, to clear the acidosis before operation. The presence of diacetic acid and acetone in the blood and tissues is certainly a factor preventing healing and encouraging coma following operation and it should be eliminated if possible. A few hours of intensive treatment with glucose and insulin bring acidosis under control. In one case, of pus appendix, (A. A.) we noted following the operation that when the acidosis appeared the patient rapidly lost ground and when this was eliminated he steadily improved. The diet is important and the patient should be fed and not fasted before the operation, in order that he may store as much sugar as possible. He is therefore given food and insulin right up to the time of operation. As food, (before and after operation) we use orange juice, buttermilk, strained oatmeal and egg white, a diet with little or no fat. Food is given as soon as possible after the operation and in liberal quantities, with sufficient insulin to control urine and blood sugar. Large quantities of fluid should be given before and after operation by mouth, or rectum, subcutaneously or intravenously. We make it a routine to give either saline or 5 per cent glucose and insulin intravenously before the patient leaves the table. If ketones appear in any amount in the urine or blood, we always give intravenously 5 to 15 per cent glucose with insulin. Following the operation the patient is placed on his regular diet as soon as possible, and fat is gradually added.

ACIDOSIS AND COMA AS A COMPLICATION OF DIABETES

There is a difference of opinion regarding the quantity of insulin to be given in the early stages of treatment. Joslin recommends a moderate dose of 10 to 20 units given immediately on diagnosis. This is given in the vein. This dose is repeated at the end of one hour and at the end of the third and fourth hours, depending on the improvement of the patient. Subsequent doses of 5 to 10 units are given every two to four hours, depending on the condition of the patient. We have made it a routine to give somewhat larger doses such as were used in the Toronto Clinic. We usually give from 30 to 60 units at the first dose, cover this with glucose given intravenously and repeat it every two to three hours as indicated by the patient's condition. Plenty of fluids are given intravenously, under the skin or by mouth if the patient can swallow. In cases of severe acidosis in which the patient is partially conscious and can be easily aroused, we give the fluid and glucose with orange juice by mouth and the insulin subcutaneously. We have had excellent results with this method. Cases which have been allowed to remain in coma for hours before receiving insulin are invariably hopeless. Joslin has made a plea that every physician carry a bottle of insulin in his bag at all times so that if he is unexpectedly called to treat a case of coma, he can administer insulin immediately and greatly increase the chances of saving a life.

Seventy-five per cent of cases of coma, occurring in children, that have been brought to us, have been precipitated by stasis of the bowels. The patients had not had a bowel action for from one to five days previous to admission to the hospital. Fifty per cent of these have proved fatal. Their acidosis can be cleared up, ketones disappear from the blood and urine. their air hunger can be relieved, but they remain in coma, with profound stupor from toxins from the bowels until the bowels are well cleared. It is very difficult to secure bowel elimination in these cases. Croton oil, 3 minims on the back of the tongue was given in one case which appeared hopeless, after every other method had

been tried. This produced bowel movement and in an hour the child was conscious and remarkably improved. The rapid recovery from stupor and return to consciousness following good bowel movement is sometimes quite spectacular.

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The Seale Harris Clinic.

DISCUSSION (Abstract)

Papers of Dr. Wilder and Dr. Geddes.

Dr. Allan Eustis, New Orleans, La.—I have observed for a number of years the close association of gall bladder disease with diabetes, and called attention to this in a paper some years ago in whch I reported thirty-six cases of transient glycosuria, 15, or 41.6 per cent of which were associated with ball bladder disease, and 6, or 16.6 per cent of which had developed definite diabetes while under observation extending over a period of ten to twelve years.

At the present time when there is so much enthusiasm over the medical treatment of gall bladder disease, it may be well to call attention to the dangers of neglecting gall bladder infection, not only on account of its effect on the heart muscle, but also because of the possibility of a pancreatic diabetes developing. In one of my cases in which the gall bladder was removed, the glycosuria has disappeared, and as yet there is no diabetes. I, therefore, urge the removal of all chronically infected gall bladders.

Dr. C. Frank Brown, Dallas, Tex.—Dr. Wilder, like many others who have access to the pathological reports of a large number of diabetics, has shown that the degree of destruction of pancreas tissue seldom indicates severity of clinical diabetes. Nor does the severity of the diabetes indicate the amount of destruction the pancreas may show at autopsy. Certainly it seems there must be other sources of insulin than the pancreas.

Of the complications mentioned by Dr. Geddes, I consider pneumonia and gangrene the most important because these are most often seen in the general run of cases, coma, since the use of insulin, being comparatively infrequent, except in conjunction with pneumonia or other infections. It is remarkable how well these pneumonias can be handled if proper attention is given to diet and insulin as well. Recently I have treated two cases, one a woman 67 years of age who six months previously had an amputation of the leg for gangrene and was at the time taking insulin. She made a good recovery and three months later was able to do without insulin entirely. The other case, a woman, age 52, had a lobar pneumonia which ran the usual course with recovery in spite of a diabetes of twelve months' duration. These cases without insulin would probably have ended fatally. The dosage of insulin in the beginning, like the dosage of thyroid in myxedema cases, frequently must be quite large, but as the metabolic processes regain balance can usually be reduced.

I should like to know of patients who have become pregnant while taking insulin. Does it increase fertility?

Dr. Wilder (closing).—My experience has been very much like that of Dr. Geddes. I should like to comment on the acute dementia which he observed in a case in which insulin was used. I have observed acute mania as a manifestation of hypoglycemia in two cases in which insulin was used. Both times, however, the amount of blood sugar was very low, and I understand that in Dr. Geddes' case it was not depressed. Hypoglycemic symptoms may develop in patients who have long had a high content of blood sugar when the level falls lower than the patient is accustomed to, although it is still high. This explanation might bring Dr. Geddes' observations into comformity with mine. In this connection an experimental observation of Chahovitch (Compt. rendu. Soc. de Biol., xciii, 652-655, 1925) is suggestive. In normal pigeons insulin causes no nervous symptoms except for a lowering of temperature, whereas in pigeons suffering from experimental beriberi the administration of insulin calls forth the nervous attacks of the disease. It may be, however, that Dr. Geddes was dealing with an instance of diabetic psychosis, such as that which was described by Auerbach. (Deutsch. Arch. f. klin. Med., xli, 495, 1887). I can remember having seen one such case before the insulin period.

In my series there has been at least one instance of pregnancy in a severe case of diabetes in which insulin was used. The patient had not menstruated for months before treatment was begun, and did not resume menstruation until after twenty months of treatment. She married against our advice. From reports, this pregnancy was perfectly normal except that it terminated at the eighth month. The child weighed only two pounds, but was otherwise normal. So far as I know, the patient's native tolerance was not affected.

I agree with Dr. Eustis that there probably exist many undetected cases of low sugar tolerance among patients with gallstones. I regard an elevated sugar curve in a tolerance test as a diagnostic criterion in suspected gall bladder disease.

The body cells generally are able to make sufficient insulin, under favorable circumstances, to prevent diabetes after the pancreas has been diseased. I should like to call attention to this fact; in general, animals lower in the scale of evolution suffer ablation of the pancreas without developing so severe a diabetes as occurs in dogs. MacLeod has extirpated the principal islands in fish, this operation causing hyperglycemia, but otherwise not seriously affecting the fish. In frogs and turtles the glycosuria is trivial, and in birds glycosuria is very rare and hyperglycemia is the only noticeable result of pancreatectomy. Dr. Mann of the Mayo Clinic tells me that geese from which he removed the pancreas developed only a transient hypoglycemia. Within a week after the operation the blood sugar returned to normal. I think that this is

what we should expect and that the lower down in the scale of life the experiments were carried out, the more self-supporting would the body cells be found to be, and the less important the pancreas. In the highly specialized upper ranks of life, many rudimentary functions of the cell are forgotten. In the case of the insulin-making function, the evidence at hand suggests that the body cells can be trained to take care of themselves, provided the destruction of the pancreas occurs slowly and also provided they are not subjected to functional overstrain during the period of readjustment.

ELECTIVE LOCALIZATION OF STREPTOCOCCI*†

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It has long been known that certain bacteria produce characteristically specific pathologic and clinical types of disease. Thus the typhoid bacillus involves especially the lymphatic tissues of the lower ileum, the meningococcus, the meninges, and the pneumococcus, the lung. Rosenow[1] observed ten years ago that the organisms concerned in chronic infection, principally streptococci, likewise tend to have a most striking affinity for the organs or tissue from which they are isolated. He has thus demonstrated that streptococci freshly isolated from infected tissues and from foci of infection in patients suffering from rheumatic fever,[2] ulcer of the stomach,[3], myositis,[4] endocarditis,[5] epidemic parotitis,[6] and numerous other diseases tend to reproduce in animals the lesion from which the patient suffers.

The recent work of the Dicks and of Dochez on scarlet fever[7] and Birkhaug[8] on erysipelas shows definitely that these diseases are due to specific organisms in the hemolytic streptococcus group. Such facts are very strong evidence for the truth of Rosenow's theory of selective affinity. Likewise clinicians are impressed with certain clinical observations which can be explained only on the basis of a specific tendency to localization of the bacteria causing chronic disease. Meisser,[9] Hardt, [10] Bargen,[11] Nakamura,[12] Moench,[13] and others working with Rosenow have been successful in demonstrating the elective localizing property of streptococci. The greater number of workers elsewhere have, however been unable to verify his findings.

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It seems most probable that failures to demonstrate elective localization are due largely to a disregard of certain fundamental and necessary technical details. It is vitally necessary in culturing the bacteria previous to inoculation that the conditions under which the organism was growing in the body be provided in the culture tube. This requires primarily a gradient oxygen tension, but also the use of media favorable for the growth of the organisms. It is very important likewise, that the least possible time elapse between the removal of the infected material from the body and the injection of the culture. By careful attention to such technical details I have been able to demonstrate a remarkable elective affinity in cases of eye infection,[14] kidney disease,[15] peptic ulcer,[16] onychia[17] and other conditions.

I have made all cultures in glucose brain broth and glucose brain agar. These media are almost specific for the non-hemolytic streptococcus and provide every degree of oxygen tension from complete anaerobiasis to full atmospheric tension. I have described fully elsewhere the method of preparation of media and the technic used in making the cultures.[14] Rabbits were injected intravenously with the original broth cultures as soon as good growth was apparent. This was usually less than twenty-four hours after the culture material was obtained. Each animal was given 5 c.c. of the broth culture. A complete autopsy was done on each animal. A certain percentage of animals died from the inoculation. The others were killed in three to six days after the intravenous injection. No lesion was considered present unless plainly visible to the naked eye of at least two observers. Microscopic sections were made from many of the tissues.

In Figure 1 are shown two cultures from peri-apical dental infections in deep tubes of glucose brain broth agar. The organisms have grown uniformly throughout all levels of the tube in one (Fig. 1 A). In the other (Fig. 1 B) the colonies are large on the bottom of the tube, but gradually become smaller as the oxygen tension increases nearer the top. In the upper level only an occasional colony is seen. The majority of the agar cultures from peri-apical dental infections show either little or no growth at the top of the tube. The non-hemolytic streptococcus (Fig. 1 C) is the predominant organism. In a recent summary of 1091 positive broth cultures from dental infections 999 contained the streptococcus, usually in pure cul-

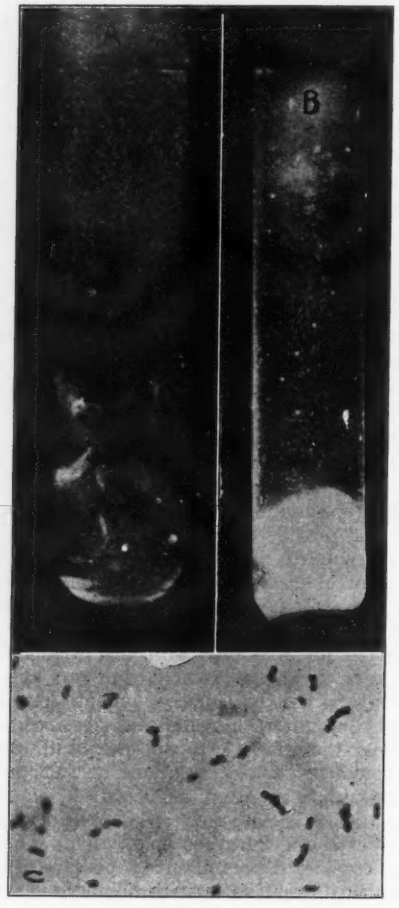

Fig. 1

A. Culture in deep tube of glucose brain agar a peri-apical infection. Note the uniform growth throughout the tube. *B.* A culture similarly made which will not grow near the top of the tube in the aerobic zone. *C.* Typical short chain streptococcus from a peri-apical infection.

ture. Hemolytic streptococci are seldom encountered in peri-apical dental infections.

The incidence of lesions in all animals injected is shown in Table 1. Only the major lesions are recorded here. Involvement of almost all tissues of the body have been observed, at different times. The most interesting thing about the table is that the incidence of lesions in animals after the intravenous injection of bacteria from chronic foci agrees quite closely with the lesions due to chronic focal infection observed clinically in man. Thus arthritis, the most common lesion in animals, is certainly the most common systemic manifestation of focal infection.

In Table 2 is shown the incidence of involvement of the different organs of the rabbit after inoculation with bacteria recovered from foci in different clinical groups of patients. The animals injected with bacteria from patients suffering from kidney disease had involvement of the kidneys in 85 per cent, while only 22 to 37 per cent of the other groups showed kidney disease. Sixty-six per cent of the rabbits injected with the cultures from patients having clinical evidence of heart or vascular disease showed lesions in the endocardium, and 36 per cent in the myocardium. Of the other groups, there was involvement of the endocardium in 4 to 15 per cent, and of the myocardium in 4 to 13 per cent. Of 110 rabbits injected with cultures from patients suffering from metastatic eye infection, 68 per cent showed infection of the eye. The incidence of the other groups varied from 5 to 7 per cent. In the rabbits injected with bacteria recovered from foci in patients having peptic ulcer, 53 per cent showed gross lesions in the stomach or duodenum or both. The incidence of similar lesions in the control groups varied from 5 to 14 per cent. It will be noted that often more than one organ is involved. It is likewise exceedingly common to find in patients more than one systemic disease of focal origin.

Fig. 2

Massive hemorrhages in shoulder muscles of rabbit injected with culture of teeth of patient (Case 1) suffering from myositis.

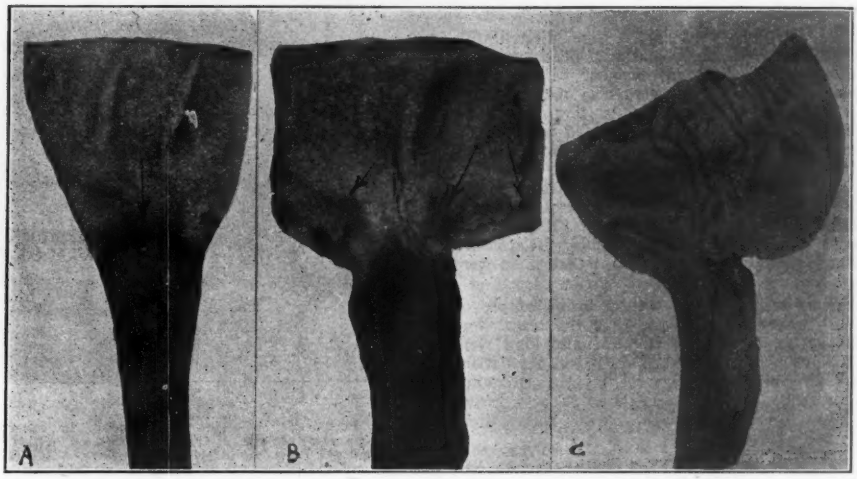

Fig. 3

A. Massive hemorrhage in a duodenal bulb of rabbit inoculated with the culture from the tonsils of a patient (Case 2) suffering from duodenal ulcer.

B. Ulcers near pylorus of rabbit injected with the cultures of tonsils after extirpation. There are also numerous hemorrhages in the duodenum.

C. Multiple hemorrhages in duodenum of rabbit from an infected molar of the same patient.

The results in these four groups of cases offer striking evidence of the truth of the theory of elective localization. The cultures have been made in a uniform manner. Each rabbit has been injected intravenously with 5 c.c. of broth culture, and every animal has been subjected to a routine autopsy. The study is at least a fair comparative one of the disease-producing power of bacteria isolated from foci in patients suffering from different types of metastatic disease of focal origin.

Various explanations are offered for the tendency to specific localization. The extent of clumping of the organism, the nature of the blood supply, the food supply, and local tissue resistance must all be factors in determining the site of localization. The most important factor, however, is some peculiar property, probably of a chemical nature, inherent to the organism. The localizing tendency of bacteria in certain foci varies from time to time. Its development is probably dependent upon local conditions at the site of the focus and also upon properties peculiar to the tissues and the fluids of the host. Rosenow has emphasized[18] that "the focus is of importance not only as affording the entrance way for bacteria, but also as a place where varying affinities may be acquired."

The characteristic findings of elective localization are best illustrated by the few case reports.

CASE REPORTS

Case I.—History: A middle aged physician had had recurrent attacks characterized by symptoms of the same type over a period of years. The symptoms were those of myositis, a low-grade arthritis, irritability of the bladder, and hyperchlorhydria. An attack was nearly always coincidental with the development of active foci of infection. Marked relief from the symptoms followed the removal of the active foci containing the organism with which the symptoms were reproduced in animals.

When first seen in December, 1923, the patient had experienced again gradually increasing pains around the small joints, recurring attacks of myositis and lumbago, stiffness of the muscles in the morning, and lack of endurance. On account of these symptoms and the absence of apparent foci elsewhere one of two devitalized teeth had been extracted. A pure culture of a streptococcus which had a marked affinity for the joints and muscle was obtained.

A new set of dental radiographs made just after this tooth was extracted revealed the presence of one of the gutta percha points over the apex of the tooth which had recently been extracted. The right upper cuspid was also pulpless but showed no radiographic evidence of infection.

The cuspid was extracted. At the same time the area of the upper right first and second molars, which was suspected of infection in the radiograph was opened and curetted. The bone was quite soft. The tooth removed from this area seven years before had had a draining fistula from it for a long time before extraction. The cultures from the curetted bone and the apex of the cuspid tooth showed in deep tubes of

glucose brain agar a profuse growth of short-chain streptococci.

Animal Inoculation.—Two rabbits were injected with the broth culture from the cuspid and killed two days later. One showed slight involvement of the joints and kidney medulla. There were also many hemorrhages in the lumbar region and a few in muscles elsewhere. The other rabbit also showed hemorrhages in the lumbar muscles and purulent fluid in the joints. Two rabbits were injected with the broth culture of the streptococcus isolated from the infected residual area. One at autopsy showed many hemorrhages in the muscles throughout the body (Fig. 2) and slight involvement of joint and kidney medulla. The lesions in the other rabbit were similar except that there were no kidney lesions.

Two rabbits were injected with a broth culture of the patient's saliva made at the time the teeth were extracted. At autopsy no lesions of any kind were found. Following the removal of these foci the patient was markedly improved. Several months later another tooth supposedly vital was found to be infected. After this had been extracted the patient was entirely relieved of all symptoms.

Case II.—History: M. C. S., a dentist, age 32, had had typical symptoms of a duodenal ulcer in 1917. Gastric analysis at this time showed a hyperacidity and roentgenograms a deformity of the duodenal bulb. Following this initial attack, there were successive similar attacks at intervals of from six to twelve months, each lasting several weeks. In February, 1924, he had a large hemorrhage. The roentgenographic examination was repeated in 1921 and 1924, the typical findings of duodenal ulcer being apparent each time.

The tonsils had been removed in 1917. He had had attacks of tonsillitis. There had been no other serious illness.

Fig. 4

A. Infected upper central incisor teeth of patient (Case 3) suffering from chronic parenchymatous nephritis.

B. Kidney of rabbit injected with streptococci from teeth shown above. Note the multiple hemorrhages in the cortex.

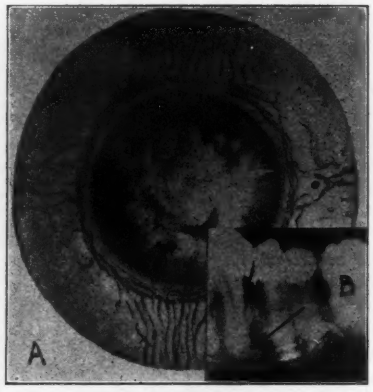

Fig. 5

A. Pericorneal injection and exudate in anterior chamber of eye of rabbit inoculated with the culture from an infected tooth (Fig. 5 B) of a patient (Case 4) suffering from iritis.

Animal Inoculation.—When seen in May, 1924, another attack was just beginning. The only positive finding on examination was infected adenoid tissue in the nasopharnyx and some remaining tonsil tissue. Pus was expressed from the tonsil tissue. Two rabbits were injected with the broth culture and killed twenty-four hours later. Both animals showed many hemorrhages in the duodenal bulb (Fig. 3 A). The tonsil and adenoid tissues were removed the following week. One rabbit was injected with the culture of the excised tissue. At necropsy there were numerous hemorrhages and necrosis in the pyloric end of the stomach (Fig. 3 B).

Following the operation there was a marked improvement in the gastric symptoms. Later he again developed gastric symptoms when a partially erupted third molar became infected. The injection of the broth culture of the streptococcus from the infected area again produced duodenal lesions in animals (Fig. 3 C).

Case III.—History: S. E. O., a woman, age 40, in February, 1924, had acute arthritis followed by acute nephritis. On a stringent milk diet she improved and the marked edema which she had had, almost disappeared. When seen six months after the onset there was still a large amount of albumen, casts and a few red blood cells in the urine. Some edema of the feet persisted.

The tonsils had been removed cleanly some years before, and three teeth had been removed during the present illness. There were three non-vital teeth remaining, two of which showed large areas of apical rarefaction (Fig. 4 A). These were removed. All showed on culture a profuse growth of streptococci.

Animal Inoculation.—Two rabbits were injected with the mixed cultures, and killed three days later. The kidneys of both animals were swollen and grey in color. The cortex was studded with pin-point hemorrhages (Fig. 4 B). There was also joint involvement, and necrosis of the heart muscles in both animals. One had also lesions in the eye, muscle and stomach.

The albuminuria manifested by the patient disappeared over a two-month period following the extraction of the teeth. The patient is now perfectly well.

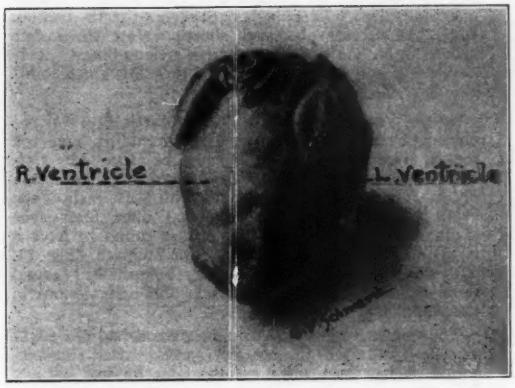

Fig. 6

Massive necrosis of almost entire right ventricle of rabbit injected with a culture from the infected teeth of patient suffering from myocardial disease (Case 5).

Case IV.—History: Mrs. F. T., a housewife, age 43, had had typhoid fever in 1914 and rheumatism during the preceding year. Her eye trouble began in 1912, with a severe attack of iritis with almost complete loss of vision in the left eye. A second attack occurred in 1916. She had no further trouble until December, 1922, when iritis again occurred in the right eye, followed by another attack in January, 1923. The patient said that a large filling had been placed in the right lower first molar in 1912. The tooth became very painful. The filling was removed to "let the gas out" and replaced. The first attack of iritis developed soon after the tooth trouble. An examination of the left eye showed no light perception, posterior synechiae, without active infection. The vision in the right eye was 20/20. There were posterior synechiae but no inflammation.

The patient was undernourished. The tonsils were small. The general physical examination was otherwise negative. Blood count revealed: red cells, 4,300,000; white cells, 8,700 and a normal differential count. All the upper teeth had been extracted. A roentgenogram showed no apparent bone infection in the upper jaw. The right lower first molar had a large silver filling, was tipped forward, and had a pocket around it (Fig. 5 B).

The tooth responded, however, to tests for vitality. This tooth was extracted. On opening the pulp chamber under sterile precautions, it was found that the pulp chamber had been encroached on by secondary dentine formation. The nerve was injected and edematous and showed a pure culture of streptococcus mitis. The same organism was obtained in the culture of the root tips.

Animal Inoculation.—Two rabbits were inoculated with the mixed cultures from the pulp and root tip on February 2, 1923. One animal developed an extreme pericorneal injection which was less marked the following day. On February 7, the circumcorneal injection had returned in the right eye. There were multiple hemorrhages in the iris and cloudy fluid in the anterior chamber, (Fig. 5 A). Neocropsy revealed also abscesses of the kidneys, white streaks in the muscles and a purulent arthritis. The other rabbit showed only cloudy fluid in the joints.

Case V.—History: L. B. N., a carpenter, age 42, complained of recurrent attacks of pain over the heart. The attacks had begun eight months previously, were always brought on by exertion and were relieved by rest. During one attack the left arm felt numb. He had always been well before the present illness.

On examination numerous extra systoles were noted. The blood pressure was 100/75. There was no anemia. The blood Wassermann was negative. The urine showed no albumen, sugar or casts. There were numerous pulpless teeth. The tonsils were removed and the pulpless teeth extracted. After the extraction of the teeth the patient felt so much better he wished to return to work. Two weeks later he began to have dyspnea which increased in severity. He complained of a feeling of pressure in the chest and developed a pericardial friction rub. Signs of myocardial insufficiency soon developed, followed by death about one year after the onset of symptoms.

Animal Inoculation.—Two rabbits injected with the broth culture from the tonsils showed no lesions of any kind. Three x-ray positive teeth, the left lower first and second bicuspids, and first molar, were first extracted. All showed a profuse growth of streptococci. Two rabbits were injected and killed three days after inoculation. One showed only an arthritis with a pyelonephritis. The other showed a marked necrosis of the myocardium involving almost the entire right ventricle (Fig. 6). A slight joint involvement was the only other lesion present.

One week later four more teeth were extracted. The left upper first bicuspid and lateral incisor were x-ray positive and showed a profuse growth of streptococci on culture. The left upper was negative in the radiograph and showed also a profuse growth of streptococci on culture. The left upper cuspid showed only a few colonies in the agar tube and was negative in the radiograph. Two rabbits were inoculated with the mixed cultures. One showed at autopsy slight joint lesions

Fig. 7

Large ulcer in stomach of rabbit injected intravenously with the cultures from the tonsils of a patient suffering from peptic ulcer (Case 6).

Fig. 8

A. Onychia in rabbit produced by injection of mixed cultures from patient's teeth. *B.* Onychia in rabbit produced by the injection of cultures from area of residual infection in bone. *C.* Photograph of thumbs of patient (Case 7) with onychia. Note the swelling around nail on left.

and yellow plaques in the arch of the aorta. The other showed lesions in the joints and muscles, marked necrosis of the heart muscle, and several vegetations on the mitral valve.

Case VI.—History: E. L. W., a man age 29, a secretary, had had copious gastric hemorrhage July 29, 1922. For six months preceding this attack he had suffered almost constantly with heartburn and eructation of gas. The symptoms were relieved by food and soda. Roentgenographic examination at the time of the hemorrhage showed a duodenal ulcer.

The symptoms were only partly alleviated by rest, diet and alkalis. He continued to have periodic attacks of "indigestion." He had had several teeth treated, one of which was abscessed, shortly before the gastric hemorrhage. He had never had a serious illness previously, and had had no attacks of tonsillitis since childhood.

Animal Inoculation.—When seen March 1, 1924, the physical examination was negative except for large red tonsils, from which frank pus could be expressed. Cultures were made from the pus expressed in glucose brain broth. Two rabbits were injected with 5 c.c. each of the broth culture. When necropsy was done forty-eight hours after injection, one animal was found to have a large ulcer of the pyloric end of the stomach (Fig. 7), with no other lesions. The other rabbit showed several small hemorrhages in the stomach, and early lesions in the medulla of the kidney.

The tonsils were removed. The patient had one slight attack of stomach trouble three weeks after tonsillectomy. When seen three months later he was entirely free of symptoms.

Case VII.—History: C. S., a maid, age 31, complained of nervousness and trouble with the finger nails. She had had the usual diseases of childhood. Four years before she had had an attack of iritis, followed by a second attack a year later. Three years before she had had two attacks of "kidney trouble." At this time she was confined to her bed and suffered from weakness and frequent urination.

The patient said that there had been swelling, redness and tenderness around the nail of the right middle finger at intervals for three years. Four weeks before an attempt was made to extract the lower right bicuspid tooth. Soon after this the right thumb became red, swollen and painful around the nail.

On examination, the patient was found to be in a good state of nutrition. The iris showed remains of an old iritis. Free pus could be expressed from the tonsils. The heart sounds were distant with the suggestion of a diastolic whiff down the left sternal margin. The blood pressure was 110/65. There was marked swelling, redness and tenderness around the nail of the thumb and middle finger of the right hand (Fig. 8 A).

A blood count showed 4,400,000 red blood cells and 8,300 white cells. A differential count revealed: polymorphonuclear neutrophils, 66.6 per cent; eosinophils, 0.2 per cent; basophils, 1 per cent; lymphocytes, 28.4 per cent, and large mononuclears, 3.8 per cent. The urine was negative for albumen and sugar and showed no pus or casts. The Wassermann test was negative.

A radiograph of the teeth revealed six non-vital teeth, only one of which showed an area of bone absorption around the apex. The root of the lower right bicuspid had been broken off and showed a large area of bone destruction around it.

The broken off root and all the nonvital teeth were extracted. One was sterile on culture, four showed Streptococcus fecalis and one Streptococcus salivarius.

Animal Inoculation.—Two rabbits were injected intravenously from each of the cultures obtained from the root ends. One of the rabbits injected with the culture from the upper right cuspid showed marked swelling around the nail of two toes (Fig. 8 B). One injected with the streptococcus grown from the upper left bicuspid showed a similar involvement of the first toe of the right hind foot. The organism injected was recovered from the nail root of the second toe of the right fore foot in pure culture. One rabbit injected with

TABLE I

Incidence of Lesions in Animals Injected Intravenously with Bacteria from Dental Infection.

Number of animals	Number of patients	Percentage of animals showing lesions in							
		Joint	Kidney	Muscle	Endo-cardium	Myo-cardium	Brain	Eye	Stomach and duodenum
1250	415	58	32	22	18	10	4	14	14

the organism recovered from the root of the right lower bicuspid had injection, hemorrhage, and edema around the nail root of the toes of the right fore foot. One toe of the left hind foot and one of the right hind foot showed the same picture. One of the rabbits injected with a culture from the curetting of the socket of the same tooth showed hemorrhage and swelling around several toes.

Altogether sixteen rabbits were injected with cultures from eight different areas. Four of the rabbits developed onychia. Two of the four were injected with the culture from the lower right bicuspid. The involvement of the thumb of the patient had followed the breaking off of this tooth in an attempt at extraction

The nail lesion did not heal completely although there was some improvement. One year after the teeth were extracted some infected areas remaining in the bone were curetted. One of the two rabbits injected with the culture from the area in the upper left side developed marked onychia (Fig. 8 C). Following the removal of these residual foci the patient has recovered completely.

SUMMARY

Bacteria from chronic foci, if etiologically related to systemic disease, tend to reproduce in animals the lesion from which the patient suffers.

TABLE II

Localization of Bacteria from Dental Foci of Infection.

Cultures from patients with	Number of animals	Number of patients	Percentage of animals showing lesions in							
			Joint	Kidney	Muscle	Endo-cardium	Myo-cardium	Brain	Eye	Stomach and duodenum
Kidney infection	48	10	73	85	25	4	4	2	6	6
Heart or vascular disease	42	10	71	33	24	62	36	2	5	14
Eye infection	110	26	61	37	20	15	7	10	68	5
Peptic ulcer	85	23	46	22	28	13	13	2	7	53
No known kidney, heart, eye, or gastric disease	965	346	58	29	21	18	9	4	9	12

Successful experimental results depend largely on the use of culture media providing gradient oxygen tension and the rapid transfer of organisms from patient to the experimental animal.

Four groups of cases are reported in which a striking tendency to elective localization is demonstrated.

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DISCUSSION (Abstract)

Dr. Russell M. Wilder, Rochester, Minn.—Dr. Haden's investigations in this extremely important field have been carefully planned and admirably conducted. He deserves a world of credit for clearly visualizing the importance of focal infection and engaging in its study at a time when others either accepted or rejected, Rosenow's preliminary work according to their prejudices. Haden has not only confirmed many of Rosenow's observations, but has added independent work which strengthens immensely the fundamental thesis of variable specificity and elective localization of bacteria.

Haden's endeavors have been of especial interest to those of us who had implicit faith in Rosenow's scientific honesty, appreciated the carefulness of his work and were in a position to see fully the injustice of so much of the criticism and opposition that he has had to bear. It has taken bacteriologists fifteen years to recognize the fact that Rosenow's technic differed radically from that employed before he began his work on rheumatic fever, or to appreciate that he had introduced a new principle into bacteriology in providing culture media with oxygen gradients. In fact many bacteriologists are still blind to the importance of this procedure and continue to attempt to duplicate Rosenow's results with organisms that have been grown out on plates, and thus exposed to the action of excessive oxygen tensions. Rosenow showed repeatedly that this is destructive of specificity, but was unheeded.

Haden was the first investigator to adopt the new technic independently, and was the first, aside from Rosenow and his pupils, to obtain results like Rosenow's. Rosenow's pupils, Bargen, Brown, Cantero, Giordano and Barnes, Kennedy, Meisser and Bumpus, Mench and Nakamura, have all done important work in this field. The recent results of Bargen in chronic ulcerative colitis impress me as especially significant, because this is a condition almost never encountered in animals injected with streptococci of other specificity than that of the organisms cultured from the ulcers of patients or from the mouth foci of patients with the disease. In this respect this study of Bargen is in a class with Haden's beautiful demonstration of elective localization in cases of multiple onychia, which likewise never occurs, or occurs extremely rarely in animals on routine injections.

In view of what has gone before, it is amusing to find Rosenow's critics, in the process of conversion, forgetting not only their former antipathy to Rosenow's ideas, but even forgetting Rosenow himself. A recent publication bearing on variations in the specificity of the pneumococcus almost borrows Rosenow's language without mention of Rosenow. Such instances of studied neglect of Rosenow's prior work are inexcusable.

The conception of the significance of focal infection originated with Dr. Frank Billings, and was based on his vast clinical experience. Rosenow owes to Billings the incentive which started his studies, but it is Rosenow's work, confirmed and amplified by Haden which forms the experimental foundation of what is proving to be a therapeutic principle of the utmost importance.

Dr. Harry C. Schmeisser, Memphis, Tenn.—Dr. Rosenow, during the year 1912, read a paper on the elective localization of streptococci before the Johns Hopkins Hospital Medical Society. He presented an overwhelming amount of data in the line of charts, cultures, photographs and even museum specimens of his human cases and animal experimentations. It was a masterly presentation of a very careful investigation. Still, it was quite evident that skepticism existed among those members of the faculty to whom we looked for an authoritative opinion. Interesting is the fact that Dr. Haden was present on this evening and subsequently received his early bacteriological training, before and after graduation from the Johns Hopkins School of Medicine, from those who were not inclined to accept Dr. Rosenow's deductions. Now, we find Dr. Haden presenting a most exhaustive and unusually brilliant confirmatory study of Dr. Rosenow's claims. One would feel, therefore, that Dr. Haden's support of Dr. Rosenow in his elective localization of streptococci should bear unusual weight.

IRRITABLE COLON*

By M. L. GRAVES, M.D.,
and
GHENT GRAVES, M.D.,
Houston, Tex.

We wish to present for your consideration today a group of cases variously referred to in the literature or spoken of as chronic intestinal indigestion, dyspepsia, nervous indigestion, neurasthenia, hypo-acidity, hyperacidity, spastic colon, spastic constipation, irritable colon or disordered colon. Until recently irritable colon has seemed to us the best designation for this

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group of cases, but as suggested by a recent article by Emery, disordered colon is probably a better term. Whatever the name chosen, we are dealing with a group of cases which continually confronts the clinician, both in medicine and surgery. Disappointed and disgruntled, these cases wend their way through various clinics, and at times submit to operation or several operations without relief.

CASE HISTORIES

Let us take up this concrete consideration of this subject by first reviewing briefly several case histories in point.

Case I.—H. G., married, white, an American stock farmer of 46, was first seen November 3, 1924, complaining of stomach trouble. His family history and past history were essentially negative. He rarely indulged in alcoholic liquors and smoked 20 cigarettes a day. For 15 years he had had heartburn, belching and colicky pains in the epigastrium coming on two to three hours after eating, and relieved by taking soda or additional food. He thought that starchy foods intensified his symptoms. The pains had grown worse, and often wakened the patient at night, though at no constant time. He had occasional spells of vomiting at variable times after meals, but at no time had the vomitus contained blood. Physical examination was essentially negative except that he was slightly underweight, a contracted colon was felt under the examining finger, and a liver edge was felt just below the costal border in the mid-mammary line. The clinical pathology showed a free hydrochloric acid value of 55 and a total acid value of 68 following the Ewald meal, but was otherwise negative. X-ray examinations showed no evidence of gastric or duodenal ulcer, but evidence of spastic colitis was reported.

Case II.—R. J. G., a single, white American salesman, of 26, was first seen June 16, 1924, complaining of gas pains across the lower abdomen. Family history, past history and habits were negative. For three years the patient had been troubled by "gas on his stomach" with sour belching. His weight had fluctuated, showing a loss of 25 pounds in the first six months after onset and a gain of twenty pounds the next six months. Beginning six months before entry he first noted a binding, gnawing pain in the midline between the umbilicus and xiphoid, which woke him early in the morning and at first, was relieved by eating. His bowels were periodically costive. Physical examination was essentially negative, except that he was underweight, and had a large, coated tongue and slight subjective tenderness over the epigastrium. His clinical pathological examination was essentially negative except that test meals showed a free hydrochloric acid of 67 and 65 with total acidities of 87 and 78 respectively. X-ray examination revealed a hypertonic stomach with ptosis and a spastic colitis.

Case III.—T. C. H., a single, white American life insurance agent of 30, was first seen November 15, 1924, complaining of aching pains across the lower abdomen. The family history and past history were negative except for typhoid fever at the age of 10. He smoked cigarettes to excess. For two years he had experienced a dull aching pain in the midline of the lower abdomen, worse after he had been on his feet all day and relieved by lying down. He also complained of a sour stomach with belching, and eating a large meal made all his symptoms worse. His appendix had been removed without amelioration of symptoms. He was very nervous all the time, and excitement seemed to make his pain worse. Physical examination was negative except for pyorrhea alveolaris and hypertrophied tonsils. Clinical pathological examinations were essentially negative. X-ray report was of spasm in the pyloric portion of the stomach and spastic colon.

Case IV.—H. S. W., a single white American clerk of 22, was first seen June 11, 1920, complaining of bloating of the abdomen. His family history, past history and habits were negative. In February, 1920, he first noted a bloating of the left side following meals, and with this he also experienced slight nausea and palpitation. His bowels were costive. At about the same time he began to have colicky pains over the abdomen, coming on one to two hours after eating, and associated with a soreness and gnawing sensation in the left lower abdomen. The symptoms were unaltered by an appendectomy in September, 1919. Physical examination was essentially negative except for tenderness and pain on pressure over the epigastrium, just to the left of the umbilicus and again over McBurney's point. Clinical pathological examinations were negative, except that Ewald test meals on two occasions showed absence of free hydrochloric acid, and values of 6 and 4 on two other occasions. The x-ray report showed duodenitis, hypermotility of the small intestine, coloptosis and spasticity of the transverse colon.

SYMPTOMATOLOGY AND SIGNS

The foregoing cases will serve to illustrate many, if not all, of the salient features of so-called irritable or disordered colon.

(1) Though the condition is not restricted to any one type of individual, we find it more commonly among the long, slender ptotic type of individual with intense emotional reactions.

(2) Gas is probably the most frequent complaint. While often it is over the greater part of the abdomen, in a great number of cases, the patients themselves have noticed that the gas is in the lower abdomen (i.e. below the navel), and they will often volunteer the information that the gas is in the intestines and not in the stomach. A large majority of them have tried soda for relief before they reach the internist's office, and almost always they report some benefit. This relief, however, comes only after belching and is at best ephemeral or transient. This is in contrast to ulcer cases where, if sufficient neutralizing alkali has been given, the relief comes first and the belching follows.

(3) Constipation is generally the rule, though there may be a history of diarrhea or of alternate constipation and diarrhea. Those falling in the constipated category acquire the cathartic habit, thereby irritating an already irritated bowel. If the cathartic taken is strong enough it will overcome the spasm and so give temporary

relief. On top of the cathartic habit many of these patients acquire the enema habit, and this also acts as an irritant. Where a bowel is already overstimulated or irritated, further stimulation or irritation is not rational treatment.

(4) Pain while not a constant feature in cases of disordered colonic function is nevertheless a frequent complaint. The pain is generally of the gnawing, gripping or cramping type—starting most often at or near the umbilicus and radiating along the course of the colon, though it may remain localized. Eating will often bring on or accentuate the pain, and at times the regular repetition of the pain two to three hours after meals suggests duodenal ulcer. Often associated with the pain is tenderness especially noticeable over the sigmoid and cecum, and not infrequently over the transverse colon. Muscular hypertension may be produced by slight pressure, and sometimes leads to a suspicion of a more active inflammatory condition in the abdomen. Often associated with the pain is a rumbling or rolling sensation, and, if the patient's observation is acute, he or she may tell you that directly following the rolling or rumbling they feel somewhat easier. Likewise, relief often follows defecation, and nearly all who have applied heat, in one form or other, to the abdomen report some if not complete relief.

(5) Many of these patients have followed their diet closely, so that they can often tell you what foods disagree with them, though it is rare that they can give you a complete list of the troublesome articles. Some have visited first one clinic and then another, and by all have been advised to eat fruits which, in point of fact, are one of the worst things possible. Many of them have avoided fruits for years, particularly raw apples and pears. They may say that they do not like them, but further questioning will usually bring out the fact that they do not like them because they feel that apples and pears do not agree with them. This also holds for cabbage and other vegetables giving a rough residue. Those people who have overloaded their digestive system for years and in whom the colon is consequently somewhat feeble and atonic, are the ones who benefit from the diet giving considerable roughage as residue.

(6) Loss of appetite is another feature frequently found in disordered colon cases, because the patient has found that eating is apt to bring on the pain and consequently he prefers not to eat or to eat very little. Their nutrition can but suffer, and, after a certain period, the patient's self-confidence becomes undermined and he or she grows gradually more and more nervous, so that many of them are hyperthyroid suspects. Loss of weight usually runs between 10-30 pounds, with or without fluctuations. Many of these cases give a history dating back 8-10 years so that we are dealing with an established chronic process. This must be borne in mind, for, it is not often that we can cure in a day what has been going on for years.

(7) (a) Disturbed sleep is common and absence of the sense of refreshment by sleep is frequently mentioned in the morning.

(b) A bad metallic taste in the mouth with a thick coating of the tongue is present particularly early in the morning and disappears upon the ingestion of foods.

(c) There is a diffused aching sensation ranging from a dull headache to a low grade unpleasant sensation in the trunk, back and legs.

(d) A mental lethargy and fatigability are likely to be present in certain cases.

(e) All the above symptoms are variable in intensity and perhaps like those in an ordinary but temporary constipation, and are frequently promptly relieved by free purgation. This gamut of symptoms and their relief lead irresistibility to the conclusion that stasis in the bowel, toxic absorption or intoxication are present and that they recur in irregular periodic waves.

(8) In the extreme case or cases with a neurotic background you may even get nausea and vomiting. If vomiting does occur it does not give the complete relief experienced by ulcer cases. Further, if a stomach tube is passed at the time the colon case complains of pain, and the stomach is completely emptied, the relief is by no means so striking or so complete as it is in ulcer cases.

(9) Turning to the question of acidity, we may find low free and total acid values, high values, normal values or even an absence of free hydrochloric acid. Many of these cases have been diagnosed hypo-acidity or hyperacidity, but we have found that the acid values following an Ewald meal in these cases vary so widely even in individual cases that they are of little diagnostic value.

(10) Stools are generally mushy in consistency in cases of irritable colon, but present no other noteworthy variation from normal. However, in the light of subsequent experience, we feel that stool examinations are important. Often the patients will tell you that they pass hard lumps

and they have what they term constipated stools, but when they submit a specimen for examination you will find that in the majority of cases it is mushy. Of course we are dealing with a group of patients who are habitual cathartic users, which may help to explain the frequency of the soft stools.

(11) A test enema 2,000-3,000 c.c. of tap water injected slowly will usually produce pain of the type of which the patient is complaining.

(12) On physical examination particularly in the thin ptotic type of individual, the colon (usually the descending colon) may be felt as a contracted spastic tube beneath the examining finger. Often there is tenderness on pressure on rolling the colon under the examining finger. The tongue, in long standing cases is thick, coated, red about the edges and shows indentations about the border. This latter we take to be a mark of emotional strain or tension.

(13) X-ray examination shows in the large majority (over 90 per cent of the some 50 cases we have had examined) a spastic colon. Barium enema is more satisfactory in these cases than barium given *per os*. We realize the difficulty in drawing a sharp distinction in some cases between the spastic and the normal colon.

(14) Proctoscopic examination may reveal an ulcerated reddened mucous membrane or it may appear normal, though recently we have been finding that a large number show small ulcerations, or abrasions, bleeding on slight pressure produced with an ordinary cotton swab. This will not occur in a normal colon.

(15) These cases may or may not have a temperature above normal. If so it usually runs 100-102°, and there is an associated or concomitant leucocytosis 10,000-15,000. Those cases with definite causal pathology such as dysentery, tuberculosis or carcinoma are apt to fall in this group, though we do see some cases where the bowel wall is seemingly intact who run a slight temperature, 100° F. with leucocytosis (10,000).

(16) Finally, in reviewing the symptomatology we would mention that laparotomy with "removal of the fixed organs" and "fixation of the movable organs" is often followed by a continuation or even an accentuation of symptoms.

PATHOLOGY

There is no constant pathological picture in these cases. Those which are due to tuberculous or cancerous ulceration of course present the pathological picture of those conditions. It seems probable that in our section of the country and the tropics a greater number of cases of this group than are generally recognized have an underlying amebic pathology. It seems probable that many cases of amebic dysentery go unrecognized because there are so few workers qualified to identify the cystic and precystic stages. Confusion may arise in differentiating these cases from chronic ulcerative colitis so thoroughly described by Logan. Bargen has reported a diplococcus resembling pneumococcus as the causative organism in such cases. Careful proctoscopic and sigmoidoscopic inspection may at once reveal the true condition and usually there is a definite history of bloody stools, frequently of a very acute character and sometimes chronic and remittent. In cases of this disease the roentgenological picture of a long, smooth, non-haustrated and sometimes contracted sigmoid, as stressed by Carman, is helpful.

In cases of "irritable colon" or "spastic colon" or "disordered colon" Emery, in a recent article, has given us the best viewpoint. He chooses to think of these cases in terms of threshold stimulus values, stating that the normal bowel reacts to the normal threshold stimulus giving rise to the normal bowel movement without pain or discomfort. Now, if this stimulus be raised, as in the case with the use of cathartics or, if the threshold value be lowered, as is the case with an ulcerated bowel; then discomfort, pains and mushy stools may follow. It is not a full nor yet a detailed description of the mechanism in these cases, but it does furnish us with a lead in the direction of an explanation. As we become better acquainted with the pathology of the large bowel, it is likely that a more satisfying and adequate explanation of the mechanism in cases of disordered or irritable colon will be forthcoming.

TREATMENT AND PROGNOSIS

(1) Any stimulant or excitant such as alcohol or spices should be removed.

(2) Rest in bed should be advised. The most satisfactory results are obtained in a hospital. Many of the milder cases, however, can be satisfactorily handled through an out-patient department or as ambulatory cases. It is well here to put in a word for the advantage of bed rest in these cases. If you tell a patient that he has heart trouble or kidney trouble, he is generally willing to go to bed and stay there, but gastrointestinal cases who have maltreated their digestive organs for years will prefer to worry along with whatever medicines you prescribe. By rest in bed we do not mean that the patient

must simply go to bed and stay there, but rather that he must learn to get the most out of his rest by adequate relaxation. In other words, peace of both mind and body is the aim.

(3) Diet is the next important part of the regime, and, in arranging a diet the attending physician should seek to eliminate the irritant articles, such as raw fruits, coarse vegetables and the condiments. Also fried and greasy foods should be taboo, and the necessity for thoroughly cooking all food should be stressed. It is well in the beginning to list the daily food habits of your patient for in this way you may avoid some unpleasant food idiosyncrasies.

(4) Tincture of belladonna, gtts. 10-20 three to four times a day is used with a view to relaxing or aiding in the relaxation of spasm. Instead of the above, other anti-spasmodics may be used, but tincture of belladonna is the most widely used, and, in our hands, the most efficacious.

(5) Liquid petrolatum or other simple mineral oil may be used for its mechanical action, though often the tincture of belladonna is sufficient. In case the bowels still remain sluggish, with the patient taking both the tincture of belladonna and mineral oil, a tap water enema of not over 500 c.c. may be employed.

(6) Often a hot water bottle to the abdomen will be found to be of distinct benefit.

(7) In cases with a definite neurotic or psychotic background, treatment will of course, have to be directed toward the clearing up of the mental disorder, but a discussion of this does not fall within the scope of this paper.

The foregoing are simple remedial measures, and by their persistent use we feel that we may help a large group of cases which heretofore have proved very difficult to treat and even more difficult to cure.

Prognosis in most cases is very favorable. Caution must be exercised in making the diagnosis of disordered spastic or irritable colon in people around or over 50 years of age, for, by so doing, we may overlook far more serious pathology, namely, carcinoma. Let us also dwell a bit on the urgent necessity of a thorough and systematic investigation of every case, ruling out cholecystitis, cholelithiasis, gastric or duodenal ulcer, appendicitis, chronic ulcerative colitis, or other serious abdominal disorder, before committing ourselves to a diagnosis of irritable or disordered colon. This point cannot be too strongly emphasized and we should exhaust every means at our command to rule out a more serious abdominal condition.

SUMMARY

(1) There is a large group of cases referred to in the literature as cases of chronic intestinal indigestion, dyspepsia, spastic constipation, hypo-acidity, hyperacidity and neurasthenia, which it would be better to class as cases of irritable or disordered colon.

(2) These cases are more frequent among the slender ptotic type of individual and present one or more of the following signs and symptoms:

(1) Gas (usually in the lower abdomen).

(2) Constipation (with established cathartic habit).

(3) Pain around umbilicus, usually and associated frequently with a rumbling sensation).

(4) Symptoms made worse by foods giving a rough residue (i.e. cabbage, apples and pears).

(5) Loss of appetite and consequent loss of weight.

(6) Nausea and vomiting in extreme or neurotic cases.

(7) Stools of mushy consistency.

(8) Test enema of 2-3 quarts of tap water usually produces pain or discomfort complained of.

(9) X-ray shows spastic colon in large majority of cases.

(10) Proctoscopic examination may or may not reveal ulceration.

(11) Slight temperature (100-102° F.) and leucocytosis (10,000-15,000) in cases of ulceration.

(12) May give history of one or more abdominal operations without relief of symptoms.

(3) The pathology is intimately linked with the pathological physiology of the large intestine about which we know very little. The best viewpoint is that advanced by Emery, who chooses to think of the increased activity as due to an increase of stimulus (as in cases using strong cathartics) or as due to a decrease in the normal threshold stimulus (as seen in cases where the mucous membrane is ulcerated).

(4) Treatment consists of:

(1) Removal of excitants or stimulants (i.e. alcohol and spices).

(2) Rest in bed.

(3) Diet, excluding foods giving a rough residue (i.e. fruits and rough vegetables).

(4) Tincture of belladonna gtts. 10-20 three to four times a day.

(5) Mineral oil for bowels, and, if necessary, tap water enema of not over 500 c.c.

(6) Heat to abdomen.

(7) Treatment of underlying psychosis or neurosis where present.

(5) The prognosis is good, except where there

is an ulcerative process due to chronic ulcerative colitis, to cancer, or tuberculosis or cases of dysentery, which often are very stubborn and difficult.

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DISCUSSION (Abstract)

Dr. C. H. Mayo, Rochester, Minn.—The old ideas of disease, developed from observation, were later made more certain by being mixed with new knowledge. This permitted deduction and new theories whereas the old ideas often led to blind alleys. The newest are to come through a study of the parasympathetic nervous systems and their actions on the glands, cells and alimentary tube in digestion. This work has been made more interesting by John Hunter of Australia, who visited this country a year ago and on the trip died in England from typhoid fever, a great loss to the world of science and investigation.

It takes time to prove theories in medicine through application to the sick, and sometimes our deductions as to results of treatment are not accepted by other equally competent observers. The world tends to appreciate medicine and medical men according as we appreciate ourselves and our work.

In the papers and discussions here, it was given as a criticism of surgery that the patients mentioned had been operated upon and not cured. It would be better to say that other troubles had been present and were not relieved, or had developed later even after a removal of a diseased gall bladder or appendix, and probably there was an associated primary cause of all the conditions. Until the newer theories concerning the course and treatment of disease (associated as well as primary) can be more generally accepted by the medical profession we must push forward the work of special investigation by open-minded workers.

Dr. J. M. Frazier, Belton, Tex.—I congratulate the author upon the selection of the title to the paper just read. It covers, in my opinion, a multitude of conditions which the general practitioner meets after the surgeon has attempted to relieve the symptoms by a "brilliant and successful" operation invading the sacred precincts of the abdomen or pelvis, and often removing innocent sections of anatomy. In my position as Supervisor of Health of two thousand young women in college, I have an unusual opportunity of observing "follow up" results. I am sure I do not exaggerate when I estimate that ten per cent of these women have the surgeon's "mark" for gall bladder, appendix, or pelvic operations. They come into the college sanitarium complaining of the same symptoms, and unfortunately many of them neurasthenic wrecks.

A more careful and conservative diagnosis with proper diet, exercise and common sense medical advise would, I feel sure, have secured better results. Dr. Graves' paper sounds a timely note of warning, and is worthy of the thoughtful consideration of the conscientious surgeon.

Dr. Will S. Horn, Fort Worth, Tex.—One of the most common causes of irritable colon, is the promiscuous, ill-advised use of laxatives in any form whatsoever. The cure of these patients depends entirely upon withdrawal of these irritant laxatives and some of the happiest patients I have ever seen have been those who got relief from the laxative habit and its attendant disturbances. Another thing of importance is relief of spasm of the sphincter ani. Often there is a fissure or hemorrhoids or fistula which must have surgical treatment before the condition higher up can be relieved. If the condition is merely a spastic sphincter, the use of graduated rectal dilators is often sufficient. Once this source of spasticity is relieved, the bowel and the patient's general nervous irritability manifests favorable improvement. The group of patients referred to by Dr. Graves constitutes by far the largest with which I have to deal, and to give them relief one must completely change the manner of living to which they have been accustomed.

Dr. John L. Jelks, Memphis, Tenn.—The Doctor's paper reveals the importance of an anamnesis in this class of cases. The case is best examined in a well appointed hospital where laboratory, x-ray and other facilities are to be had.

I would classify most cases in three groups. I refer first to the infective type, because I believe them most frequent in the South where amebic flagellates and other parasites are found. Inclusive in this class is a very considerable number of streptococcus inflammations of the colon, caused by pyorrhea alveolaris, pussy tonsils and infected sinuses. The second group is that class of cases caused by malignant and other ulcerated and stenosed conditions. Finally, the third class, has prenatal bands or new formed bands or adhesions.

The first class must be cured of the parasitic or other infection. The foci are cleared up and then treated first by relief of spasm, which temporarily results from the injection of a solution of magnesium sulphate. This is followed by selected treatment for the ulceration. If the case does not progress favorably, the abdomen should be opened, mechanical obstructions relieved which may be at any point from cecum to rectum, and an appendico-cecostomy performed as a means for better treatment.

PSYCHONEUROSIS AND INDUSTRIAL COMPENSATION *

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The best therapeutic agent in the treatment of traumatic neurosis undoubtedly is return of the patient to regular work. The very nature of the agent producing the injury, with the accompanying circumstances and the mental processes involved, makes this true.

Suppose, for example, that an employe receives a slight trauma to the head or other part of the body, or his duties produce a muscular "strain," or he receives a "jerk" or "fall." He may or may not cease work immediately, but he afterwards remembers he was unconscious for a short while or at least "dazed."

He fails to return to work, notifies his employer he has been injured and says he has headaches, feels dizzy, is easily exhausted and his heart palpitates and he "shakes" if he exerts himself. In addition he notes that he sweats easily and profusely and there may be weakness and numbness of a leg or arm. It is then that the mental process sets in that causes him to think he is seriously injured and deserving of compensation for an indefinite period, which may cause him to settle down to a life of invalidism, although he is able to be up and about.

In contrast to this take a similar injury to a farmer or a person engaged in an occupation in which compensation is not a factor. No one ever heard of such prolonged disability in their cases following trifling injuries. Yet these trifling injuries are occurring every day in agricultural and non-compensated pursuits.

Common sense makes it apparent that there could be no lasting or serious injury in these cases because of the trifling nature of the agent producing the trauma.

But when the family physician comes in following a trifling injury to a person eligible to compensation and makes a diagnosis of traumatic neurosis and the representative of the insurance carrier visits the patient and then another physician, designated by the Industrial Commission, or the insurance carrier, or the patient, is called in, there is no question in the mind of the patient that his condition is serious. Too many persons are interested in him. His case just has to be serious or so many would not be interested. Here is where the danger of chronic invalidism appears. The thing that the doctor and all interested should do is to get the patient back to work and disabuse his mind of the idea that he is in a serious condition.

Let him become thoroughly and honestly convinced that he is an invalid and he is lost as a producer, and the compensation is lost, and you and I, as members of society, pay the bill. There is no reason, if the patient is handled right, that he should not be an economic asset instead of a liability.

We physicians, too, are largely to blame. We have evolved a nomenclature ranging all the way from traumatic neurosis to split infinitives in endeavoring to establish minute and imaginary differences in type. If the claimant seems agitated, it is anxiety neurosis. If he is just tired, it is neurasthenia. As a matter of fact it is just nervousness and is not a disease at all. It is a condition, though, that is prolonged, and sometimes initiated by repeated examinations and conflicts with claim adjusters.

Physicians deserve censure for these hair-splitting diagnoses. These differences often are merely technical and have no real significance; but the hearings for compensation are before laymen and not physicians and consequently these superfine diagnoses of types confuse the laymen and give added importance to the case.

The physician should help the claim adjuster settle the case fairly, both to the claimant and the insurance carrier, but he certainly should get it adjusted as soon as possible and get the patient back to his regular occupation.

Claim adjusters have lost much faith in human nature because of exorbitant demands of many accident victims and it is frequently the unenviable task of the physician to serve as a balance between these men and the claimants.

The physician should always bear in mind a fact which I firmly believe to be true: these same claimants are not conscious malingerers, but firmly believe in their symptoms as narrated. Why shouldn't they? Haven't many persons shown great interest in their cases since their injury?

Claim adjusters should be men of the greatest possible tact and kindliness, whose aim should be conciliatory and not antagonistic, and for the good of both claimant and insurance carrier, they should endeavor to settle each claim in the shortest possible time after the injury and thus get the man back to work.

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*Read in Section on Neurology and Psychiatry, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

Failure to get the claims settled early, the display of so much interest, and use of the many and various terms as diagnoses in these cases have made permanent invalids of numerous accident victims who really have nothing the matter with them.

I know of one woman employee who was struck by a falling locker in the dressing room of an industrial plant, receiving nothing more than a "jar." She was not even pushed aside, but she has not worked for weeks. She is performing her household duties and drawing compensation nearly equal to her former wages.

This is a typical example of traumatic neurosis. It is obviously unjust to the insurance company and certainly not good for the woman's morale.

Again, let me urge that the patient be gotten back into regular occupation at the earliest possible moment. Remember there are no long drawn-out cases of invalidism among farmers and others engaged in non-compensating occupations from this cause.

DISCUSSION (Abstract)

Dr. M. A. Bliss, St. Louis, Mo.—It has been my experience that in the absence of objective signs of traumatic damage to the nervous system, few of these patients remain under a physician's care after settlement of their claims.

I do not intend to infer that all, or even a majority, are consciously malingering, but the law of psychology applies. When the matter is settled it gets out of the spot-light of consciousness, other interests take its place and the nervousness subsides. Unstable personalities of abnormal make-up return to their usual level, where they were before the accident.

INFLUENCE OF POSTURE ON THE DEVELOPMENT OF THE CHILD*

By THEODORE TOEPEL, M.D.,
Atlanta, Ga.

This subject may be introduced by considering the best posture that will induce health in the developing body of the child.

Thousands of years ago we are supposed to have walked on our hands and feet, and our spine was built on straight lines instead of in the compensatory curves caused by the familiar present upright position, but today we must consider the child's perpendicular posture as the one in which we all are concerned.

I shall attempt to call your attention to a few points which I have observed in orthopedic practice and in many years of observing child development.

An exterior ideal posture has gradually been developed by comparing thousands of measurements made by athletic trainers, army surgeons, pediatricians, life insurance examiners, school physicians, industrial surgeons and many others who are interested in judging quantity and quality of physical output.

This view of an ideal posture is also the result of training the senses to beauty and harmony which dates back to the Grecian era and the present day's results of anthropometry. It is always displayed by a figure with a high, well rounded chest, a firm, broad, well developed upper abdomen, with head erect and the chin drawn in, the lower abdomen drawn in or flat, in the positions of standing, walking or running with the weight well forward on the feet. As Dr. Goldthwaite tells us we should:

"Stand up, sit up, stand tall, sit tall, throw a big chest, make your waist or abdomen flat, stand or walk forward on the feet."

Greater importance is being given to the subject of correct posture by great industrial organizations. The recent war also emphasized the right use of the body, and the "position of the soldier" very soon was shown to be more efficient than careless untrained carriage. This position is best suited to meet the sustained physical strain that may be required of the soldier.

A graceful, well poised woman with what is called queenly carriage always attracts attention. The same is true of a strong well poised man. Efficiency, strength, energy, vision, all are suggested in a way that is painfully lacking in the common drooped figures with round shoulders and relaxed abdomens seen so much at the present time.

The causes of poor posture may be divided into two classes, those due to congenital malformations and to acquired deformities.

Congenital Malformations. — Developmental defects are due to arrested development as noted in deficiencies in growth of bone, to intra-uterine amputations from bands or amniotic diseases, or to intra-uterine trauma or pressure such as occurs in club-foot.

A trauma of the ovum in its first plastic month of development, even from a violent coition, may be sufficient so to derange the controlling nerve-cells that defective formation in some re-

*Read in Section on Pediatrics, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., November 9-12, 1925.

gion of the body will be the result through nutritional disturbances in germ cells.

Hereditary influences extending through several generations of deformities are so common that they are universally recognized. Family weaknesses are likely to be transmitted by consanguinous marriages. When two neurotics marry, spastic or defective children may be expected.

Maternal Impressions.—While extreme fright, lightning storm or long protracted illness during pregnancy may have its effect in producing a spastic or feeble child, the many peculiar coincidences of malformations are not the result of mere maternal impressions. The only time when such a mental effect could produce a positive influence upon the ovum would be in the first embryonal month and then only by impressing central nerve-cells to such an extent that formative supervision is affected. The fanciful supposed resemblance of the malformed infant to some observer' object is studied out by the mother after its birth, not before.

Causes of Acquired Deformities.—Tuberculous and infective joint diseases, rickets, osteo-arthritis and arthropothies have a marked effect in the production of deformities. The distortions of rickets, when a patient is allowed to sit, stand or walk during the stage of softening, are found in all parts of the body. Muscular contractions, paralysis enter markedly into the causes of back-knee, acquired talipes, etc. Spinal neuropathic conditions, such as tabes, central or peripheral nerve irritations, muscular dystrophies are frequently productive of deformities.

These congenital or acquired malformations are the causes in the majority of cases of poor posture which interferes with the normal development of the child.

The deformities of the thorax and the spine are of a more serious nature and materially affect posture and development. They are: round shoulders, lateral spinal curvatures, sway-back, round shoulders with sway-back, and tilted pelvis as a result of spinal abnormalities or from shortening of one of the limbs. The contracted chest and lateral spinal curvature influence the free movements of the ribs, crowd the lungs and interfere with the free interchanges of gases. The position of the heart and aorta is sometimes affected. The same may be said of the liver, kidneys and spleen.

The only too frequent posture of round shoulders with sway-back and descended, projected abdomen affects the abdominal contents. The shutting down of the ribs on the upper abdomen shortens the distance between sternum and pubis, thus lessening the activity of the abdominal muscles and crowding the viscera downward.

The low placed stomach and dropped and kinked intestines may cause a variety of symptoms. The failure of such a stomach properly to empty itself, and the drag on the duodenum with interference with the drainage of the bile ducts may cause gastric attacks with nausea. The lax abdominal wall with the lowered large intestine will interfere with the proper evacuation of the bowels and produce chronic constipation.

The Tilted Pelvis.—Tilting may be either anterior or lateral. The anterior may be caused by marked lordosis of the lumbar vertebrae, while the lateral may be caused either by lateral curving of the lumbar vertebrae or by unequal development of the lengths of the two lower extremities. Either structural deviation from the normal will affect the position of the intestine, and in a girl, is sure to affect seriously the position and development of the reproductive organs.

The effect of poor posture will manifest itself in leg, knee and foot ache. Children of this type fatigue easily after an ordinary amount of play. They show nervousness, irritability and restlessness at night.

Thus far it appears that the growing child has not much of a chance. But the earnest application of a number of prominent physicians to the study of endocrinology with special reference to development and the light that physiology has thrown on the importance of muscular action, especially tonus, and the startling advances that the chemical laboratories are daily revealing to us in food analysis and the benefit of physiotherapy, promise the child of today a brighter future than it ever has had before.

The physiological functioning of the pituitary gland should be considered, which in the early life of the child controls the skeleton, and causes the epiphyses of the long bones to unite with the shafts at the proper time. Either an overstimulation or under-stimulation may interfere with the proportionate development of the skeleton.

The body is maintained in its upright position by the powerful action and counteraction of various groups of muscles. The physical conception of stable balance is not applicable in this connection. There is a constant wavering of the

body forward and backward which is controlled by the contraction and relaxation of the muscle groups. This muscular contraction, which holds the body in the upright position depends on "muscle tonus," which is slight persistent tension of healthy muscle, and its loss or diminution is shown by alteration of the normal attitude of the child.

This tonicity is not evenly distributed through the skeletal muscles. It predominates in all those muscles that produce the normal attitude of the body. We find it in the muscles which keep the vertebral column erect in standing; in the muscles of the neck that hold up the head. In general, it is found in those muscles which counteract gravity.

The upright posture depends largely upon the tone of the muscular structure and the physiological development of the skeleton, and both are dependent upon health and nutrition. Time does not permit nor do I deem it necessary at this gathering to enter into an exhaustive discussion of the importance that food plays in maintaining a proper posture conducive to good health. I will briefly call your attention to the energy value of food in calories which varies in every growing child, to the varying needs of the chemical components of foods, and lastly to the importance of the vitamin content of food. This latter is particularly important in the development of skeletal tissue.

Treatment.—For convenience I divide the treatment into the corrective and preventive. The corrective treatment is most applicable to congenital deformities where we will find the majority of malformations in the feet, usually club feet or flat feet. If they are taken care of soon after birth these foot deformities are easily corrected. There are occasional congenital hip dislocations which are more difficult to handle. I wait until the fourth or fifth year of life, depending upon condition of bone and musculature before attempting the bloodless reduction. Bow legs and knock knees, where the long bones are involved are usually the result of rickets, and are best corrected by postural rest in the very young, proper diet and sunshine. In all conditions caused by rickets, especially where the lower extremities and the spine are involved I insist on a prolonged recumbent position, at least long enough for the element of food to have its beneficial effects and danger of osseous deformities to have passed.

A thorough physical examination should be made of every young child. This should include x-rays for the purpose of discovering any abnormal bone development. Mother's milk should be analyzed, so that we are sure it contains all the food elements necessary to develop normal muscular and bony structure, and we should change the mother's diet to increase the elements deficient in her milk. After weaning outline a rigid diet suitable to each individual case, as no two children will thrive equally well on the same formula.

If the examination reveals the slightest evidence of rickets, a special antirachitic treatment must be instituted in the form of a well balanced diet to stimulate development. The uses of cod liver oil and radiant energy in the form of ultraviolet light, both acting in the same way in preventing rickets, facilitate absorption of calcium and phosphorus from the intestine into the blood stream. Monthly, preferably weekly, x-rays should be taken to ascertain the progress of the condition.

The apparently healthy child of pre-school age should not be cuddled and protected but should be thrust into nature, exposed to its elements and taught to take care of itself by enjoying natural play in the sunlight with the skin exposed to it, unhampered, uncontrolled, developing a tone of muscle which will influence most beneficially all vital organs and the skeleton, so that when the State lays its hands upon such a well-developed child, it will be ready to stand more successfully the restraining physical influences of an education.

I shall not attempt to follow the child to the school room where entirely different physical and hygienic conditions await it, which would require an essay in itself.

SUMMARY

(1) A general status of good nutrition of the developing child guarantees a good nutritional condition of the muscle and a good tonus. In periods when rapid growth uses up a great deal of the nutritional facilities of the child motor rest is indicated.

(2) A growing child should lie, sit and stand in good posture for the purpose of maintaining full vigor and health, to allow proper growth and development. In correct posture the great organs of the trunk, heart, lungs, intestinal tract, liver, kidneys, reproductive organs, and other viscera are in a position to perform work to the best advantage.

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TROPICAL DISEASES AND PUBLIC HEALTH

THE PREVENTION OF DENGUE*

By Moise D. Levy, M.D.,
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During the past few months several of the coast counties of Texas, have been experiencing the effects of another severe outbreak of foot and mouth disease, among the cattle. This epidemic has been a rather costly one, even when considering only the actual outlay of money for indemnification and salaries, the state and federal agencies having already spent something like a million dollars. In a previous epidemic, during 1924, nearly a half million was spent. This disease, of course, was only among the animals and mention of it is made here only for the purpose of comparison.

During the past few years we have had the misfortune to be visited by several mild epidemic diseases affecting man, and in not a single instance, or I might say, in all combined, was anything like the above sum expended in preventive measures. Human life and suffering still seems to be rated much below that of animals, as it would appear that it is only when the commercial life of a community is threatened that an adequate public health measure can be successfully carried out.

During the epidemic of bubonic plague, it was the effect that such an outbreak would have upon the commercial life that was emphasized and was used to stimulate the interest of the public in the proper preventive measures. For this reason we might almost be led to wish that such infections as dengue would occasionally be accompanied by a few mortalities, in order that more interest might be aroused in their prevention.

During the last great epidemic of dengue which visited the South in 1922, it has been estimated that in the course of a few months there were some 500,000 to 600,000 cases, in Texas alone. Chandler and Rice[1] estimating the days lost per case at seven and a half and the money expended for drugs and medical attention at three dollars, find that something over 10,000 years of time and $1,500,000.00 were lost to the State, by this one epidemic. It has been impossible to arrive at anything like an accurate idea of the amount of money expended in preventive measures, but in the city of Houston, $5,000.00 was expended that year, in anti-mosquito work, and $10,000.00 each year subsequently. Even with this pitifully small amount (when compared to the enormous amourts expended for foot and mouth disease) there have been satisfactory results, as very few cases of dengue have been reported in subsequent years and nothing even simulating an epidemic has occurred.

In speaking of preventive measures in dengue, one is almost tempted to suggest the well known quack method advised to rid a habitation of flies, that is, procure two small pieces of wood, place the mosquito on the lower piece and strike forcibly with the upper piece of wood.

Cleland[2] in his definition of dengue, states that it is due to a "filter-passing organism, conveyable by the Aedes Stegomyia fasciata," now known as the Aedes egypti. The definite limitation of the transmissability of dengue to the Aedes egypti has, to a certain extent at least, simplified the methods of prevention.

Cleland's observations have been definitely and conclusively corroborated in the work of Chandler and Rice, Duval and Harris[3] and more recently by Siler, Hall and Hitchens,[4] of the army. These latter workers have clarified several questions concerning dengue, the summary of their work being briefly as follows:

"Aside from definitely proving that the Aedes egypti transmits dengue and eliminating the Culex quinquefasciatus, as a transmitter of the disease, it was shown that dengue patients were capable of infecting mosquitoes at least during the first three days of the disease.

"The developmental period of dengue virus in the mosquito was shown to be at least eleven days and the mosquitoes were found to harbor the infection for very long periods of time and probably throughout the remainder of their lives."

A review of the habits of the Aedes egypti almost suggests the preventive measures to be employed in eradicating them from a community. The Aedes is essentially a domestic mosquito and while not breeding in water in the ground, it finds no lack of breeding places. Urns and vases in cemeteries, and bulb containers in homes, are breeding places which are frequently overlooked. In any place where

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water collects about the house the Aedes will find and make a breeding place.

Malcolm Watson,[5] writing on mosquito control in the "Practice of Medicine in the Tropics," states that "the work of destroying this insect requires a high degree of organization, infinite perseverance, no ordinary detective skill and a stout heart." A thorough education of the public as to the habits, breeding places and methods of destruction is necessary for the success of any campaign. To accomplish this a carefully prepared and energetically executed program of propaganda is essential. After the public has been thoroughly aroused a large force of laborers, under competent supervisors, is necessary, so that every house in the district assigned to the supervisors, may be visited one day each week and all breeding places eliminated. That this is possible of accomplishment has been definitely proven by the late J. H. White, in New Orleans and by Gorgas, in Panama and Cuba.

The control and eradication of such a disease as dengue is so intimately associated with the daily habits of the individual in the community, that we may be justified in considering it more a problem of hygiene than of sanitation.

Boyd[6] has very clearly put the situation when he states that:

"An enlightened policy, on the part of the public health officials, together with administration by trained sanitarians, in other words the activities of a few individuals, can secure all the benefits arising from adequate sanitation to a community, without the very active co-operation of the individual citizen."

In the consideration of dengue, embodying as it does the question of personal hygiene, we find, to quote further from Boyd:

"This (hygiene) can be effectively promoted only through the aroused interest and education of each individual in the entire population concerned. This stage will naturally arrive slowly and it may require the span of one or two generations before hygiene attains the position occupied by sanitation at the present time."

But when it arrives dengue will have taken its place among those diseases which are of historical interest only.

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DISCUSSION (Abstract)

Dr. M. F. Boyd, Leesburg, Ga.—The public health importance of dengue is a question upon which divergence of opinion is justifiable. However, the widespread epidemic of dengue recently experienced indicates a more serious state of affairs. Dengue and yellow fever are both transmitted by the same mosquito, *Aedes egypti*, and we may expect that if the density of this insect is sufficiently great to cause epidemic prevalence of the one, it could likewise cause epidemic prevalence of the other, should the virus unfortunately become imported. It indicates that the anti-stegomyia work is not being satisfactorily continued.

HEALTH EDUCATION TO PREVENT HEART DISEASE*

By M. L. Townsend, M.D.,
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IMPORTANCE OF HEART DISEASE

Consideration of the subject of heart disease is justified on the ground that available data indicates now that heart disease is the greatest single cause of human death. Furthermore, it is estimated that for every death from this cause in any one year, there are seventeen other persons suffering from heart disease in demonstrable form. In other words, after heart disease becomes demonstrable there ensues an average period of seventeen years of partial and complete invalidism before death finally claims the victim.

If, then, heart disease is the greatest single cause of death and if each death is preceded by an average of seventeen years of varying degrees of invalidism, certainly no other problem deserves at the hands of the medical profession and the public health worker more serious consideration.

Only a few years ago tuberculosis led the list of executioners and several other causes of death came in ahead of heart disease. The natural question then is, what is it that has given to heart disease such a remarkable burst of speed that has enabled it to outstrip all of its competitors? What has come about to make such an apparently sudden and terrible increase of this condition?

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Some one will answer:

"You are wrong. There has been no change in heart disease, but the seeming reversal of positions is occasioned by the tremendous lowering of the mortality from these other formerly more terrible diseases. They have dropped back while heart disease has continued in its same pace."

This, of course, is in a sense true. Tuberculosis and its cohorts are being conquered, they do not kill nearly so many as before. Statistics show that many of the once terrible killers do not now kill half so many people per thousand population as formerly—thanks to health education and the promulgation of sanitary protecting laws.

But statistics also show that the increase in heart disease is not only apparent but actual, show that many more people per thousand population die from this disease now than ever before.

HEART DISEASE KILLS IN MIDDLE LIFE

The explanation is simple. The mortality curve for heart disease begins to mount in that group entering the fourth decade of life, rapidly rises during the fourth decade and into the fifth. Each death was preceded by an average of seventeen years of sickness, which began at about maturity. Naturally when the average age at death was forty years, only a few persons reached the age when heart disease kills. They had heart disease but an intercurrent tuberculosis, for instance, came along and got the credit or the blame for taking them off.

While heart disease is actually, as well as relatively, killing more people now than ever before, we will not admit that heart disease is any more prevalent during the second and third decades of life now than it was fifty years ago. As a matter of fact, we contend that heart disease is decreasing and that if it were not decreasing it would show an even greater destruction than it does.

Extensive efforts at health education are so recent, and effective education to prevent heart disease must precede by so many years any notable reduction in incidence that we are only just now reaching the place where results of attention to infections can be noted. The cardiac mortality today is determined by conditions which existed seventeen or more years ago. This fact is what makes heart disease stand out in a class by itself in marked contrast to tuberculosis, typhoid fever, and diphtheria where protective measures begin showing results immediately.

While incipient heart disease is on the decrease even while deaths are relatively greatly on the increase, this actual decrease incidence is the result of corrective efforts which were not primarily directed toward decreasing heart disease.

We have done much to remove foci of infection in tonsils, teeth and sinuses, but much of it has been done without a conscious realization of the fact that these foci of infection were the antecedents of peri, endo and myocarditic conditions which would cause death seventeen or more years later if some other disease did not kill the sufferer in the meantime. Health education is the remedy and the only remedy that will control cardiac mortality.

ROLE OF THE MEDICAL PROFESSION

From time immemorial, the medical profession has concerned itself with healing the sick and attending the crippled and maimed. It has ever worked in the role of a wrecking crew whose duty it was to care for the wrecks. As important as that function is, there is for the medical profession a far greater field of usefulness. On our hazardous coasts the beacon lights of the light house send out warnings that save more lives and more economic loss than all the life boats and life savers of all time.

We are coming to realize that preventive medicine and constructive medicine are of infinitely more importance than curative medicine. The new role of the medical profession, which should and does dominate the thoughts and motives of every conscientious physician, is to stand as a beacon light to protect his clientele from the dangers they do not see. His paramount duty is, whether all yet recognize it or not, to teach his people preventive measures and constructive health. Just as the salvaged cargo can never be worth what it was originally, so the human body, once wrecked and damaged, can never again be brought back to its original degree of perfection.

CAUSES OF HEART DISEASE

Of all the cases of heart disease coming under authentic observation in public and private practice, about 80 per cent are attributed to "general infections" and the remaining 20 per cent to chemical poisonings, i.e., alcohol, tea, coffee, tobacco and industrial poisons; faulty habits, i.e., indolence, obesity, extreme physical exertion without sufficient training; and congenital mal-developments.

Of the 80 per cent due to general infections,

60 per cent are attributed to "rheumatism," 20 per cent to focal infections and 20 per cent to syphilis.

That is, eighty of every one hundred heart cases are the result of some form of bacterial toxin. Sixteen of these eighty are because of the toxin of the spirochete, sixteen others of these eighty are because of the toxin of some other determined infection, but forty-eight of these eighty are simply classified as resulting from rheumatism which on the face of it, is only saying that we do not know the infecting organism.

Theoretically, then, every form of heart disease is preventable except that very insignificant per cent which is congenital.

Even here there are those who say that fetal endocarditis is observed and must play a part in the causation of malformations.

ENDOTHELIOTOXINS

In the broad sense "rheumatism" is a common manifestation of one of several, or several endotheliotoxins, just as fever is a common manifestation of one of many, or several combined infections. Endotheliotoxins are classified by their action rather than by the agent eliminating them. Any toxin which is deleterious to the delicate endothelial cells of heart, joints or tendon sheaths is an endotheliotoxin.

The toxin of Neisseria gonorrhea and the toxin of Neisseria rheumaticus each alike destroys endothelial cells. Perhaps all other schizomycetes of this genus also eliminate endotheliotoxins and thus are important factors in the etiology of so-called "rheumatism."

However, diplococci are not the only bacteria which eliminate toxins that are destructive to serous cavity lining membranes, and the name by which we call the resulting symptoms is of no import, provided only it identifies the picture we wish to designate.

The important point to bear in mind is, that any toxin which irritates and damages the endothelial cells of joints and tendon, muscle and nerve sheaths will also damage the endothelial cells of the pericardium, myocardium and endocardium.

Tonsillitis, sinusitis, pyorrhea alveolaris, root abscess, scarlet fever, diphtheria and typhoid localizations, pyelitis, cystititis, cholecystitis and even colitis are unquestionably the cause of much that is called rheumatism. The toxins from these strains of infection produce in varied form all the classical symptoms which the word suggests and the clearing up of such infections clears up the symptoms.

ENDOTHELIITIS

If then any toxin which is destructive of endothelial cells is called an endotheliotoxin, the resulting inflammatory process should be called endotheliitis. This term is at once self-explanatory, is scientifically correct and is thoroughly comprehensive because it includes every thing that has ever been called by the meaningless name rheumatism, and, in addition, it includes that concurrent but usually unrecognized inflammatory process in the heart structures.

In the muscle, nerve and tendon sheaths, and in the serous cavities of joints, there is an abundant supply of sensory nerves, therefore an endotheliitis is manifested by pain in these regions. These tissues being more or less superficial, the subjective symptom of pain is accompanied by the objective symptoms of swelling and redness. The endothelium of the pancardium is not supplied with sensory nerves, hence inflammation there does not produce pain, and because of its location the usual objective symptoms of irritation are not objective, unless dysfunction is produced. Indeed, dysfunction, which is the limping of the crippled heart, is practically always the first indication of any heart involvement. Endocarditis is endotheliitis in the heart. What has been called rheumatism, neuritis and arthritis is in fact an endotheliitis of muscle, nerve and tendon sheaths and serous cavities of joints. This is equally true whether the cause of the inflammatory process is gonorrhea, another known focus of infection, some infectious disease, or when the cause is unknown just a simple rheumatism.

EARLY MANIFESTATIONS OF HEART DISEASE

Whatever the etiologic agent, heart cases almost invariably give a history of some form of infective toxemia or chemical poisoning. This may have been called growing pains, rheumatism, arthritis, neuritis, diphtheria, scarlet fever, syphilis, gonorrhea or a host of other names. Necropsies usually show extensive endocarditis, often with an old valvular lesion which is the sequel of former rheumatism. The post mortem changes in the joints are not, as a rule, striking but in the large arteries there appears a true inflammatory mesarteritis. The subcutaneous nodules, so often seen in rheumatic children, are intimately connected with deep fascia and tendon sheaths and are the re-

sult of a central coagulation necrosis of fibrinous inflammatory exudate which occurs from this type of endothelial tissues.

The endothelium of the endocardium seems to be a chosen spot for the deposit of fibrinous exudate. It has been suggested that this may be due to the constant movement of this tissue. The organization of this fibrinous exudate leads to adhesions of varying extent between the visceral and parietal layers.

The peculiarity of the effect of the endotheliotoxin upon the endocardium is the formation of fine warts or vegetations on the valves. These may be small corrugations along the line of closure of the mitral or tricuspid valves or on the cusps of the aortic and rarely on the pulmonic valves. These vegetations may ulcerate with destruction of tissue and also they may accumulate fibrin and red cells on their surfaces.

When portions of this accumulated infectious material breaks loose there result infectious or mechanical emboli. Instead of vegetations the valves may show erosions, ulcerations and perforations. This inflammatory condition may, and often does, extend to the walls of the auricles, ventricles and vessels. In the valves the process may result in defects of closure or in constriction of the opening. Furthermore, the myocardium shows changes in nearly all cases. The muscle is soft, the cut surfaces paler than usual and there appear frequent small hemorrhages. Microscopically there is indicated a parenchymatous change with infiltration of leucocytes.

These are some of the findings at necropsy in the acute stage, and they make it easy to understand what must follow when the patient survives and becomes a chronic heart case.

RHEUMATISM NOT A DISEASE ENTITY

If "rheumatism" were a disease entity, caused by one specific organism, then a serum found beneficial in one case would necessarily be beneficial in all cases, just as diphtheria antitoxin is found beneficial in all cases of diphtheria. But this is not true. Serum therapy has been very erratic, and on the whole, very unsatisfactory. Many different sera have been variously used with, sometimes, apparently good results and the balance of favor has always been with the specific autogenous sera.

We speak of this only to prove that the causes for heart disease are many. The responsibility is on the medical profession to correct early foci of infection or any other infection, especially in early life, which experience has proven to be an important etiological factor in heart disease. Our contention is that there is no such mysterious thing as a disease entity called rheumatism which is given as the cause of the great majority of later developing heart cases, but rather that growing pains, inflamed joints and the very common picture called rheumatism are early manifestations, concurrent with the time when any one of a great many toxins is doing damage to heart tissue. The toxin from a root abscess, tonsils, sinuses or any focus of infection produces an inflammatory condition in all endothelial tissue, the heart as well as muscle sheaths and joints, while pain or discomfort does not occur in heart tissue but only in joints and muscles. Therefore, the individual, and also often the attending physician, is not reminded of any heart injury until perhaps years later when the damaged tissue is the occasion for impaired function. When the discovery is made it is then too late to prevent invalidism for it is the scar that produces impaired function and scar tissue can never be replaced by normal tissue. The only help for the individual then, is to adjust his regime of life to meet the heart condition. The power of the damaged motor cannot be increased, hence the only alternative is to adjust the load. By doing this and by assuring ourselves that no further damage is being done by continued toxic inflammation, the damaged heart may continue to function in an imperfect way for many years.

TIME TO PREVENT HEART DISEASE

The time to prevent the primary injury is early in life when the child first complains of aches and pains in those organs with sensory nerves.

If the mortality curve for heart disease is brought down it will be only by recognizing and correcting the very first step in the long and complex chain of events that leads up to it. In the exact proportion in which we eliminate infections (and rheumatism) in children will the mortality curve for heart disease in years to come come down. The time to prevent or cure heart disease is seventeen or more years before death from heart disease occurs. The past generation of the medical profession is responsible for the present mounting importance of heart disease. Will the present generation of the medical profession permit the curve to remain high when today's children pass the age of forty?

MEANS OF PREVENTING HEART DISEASE

The means, and the only means whereby the number of victims will be reduced is the skilled and conscientious attention to the little child with aching muscles, but accused of having "growing pains," the care of neglected decayed teeth, the discovery and removal of all foci of infection, whether of the tonsils, sinuses, bowels or what not, and repeated careful examinations of the heart subsequent to attacks of any acute infectious fever to discover what and how much that injured heart can stand.

ESSENTIAL COOPERATION SECURED BY HEALTH EDUCATION

To accomplish this end, the full cooperation of the people must be secured and the degree of this cooperation will be determined by the degree to which they know the facts. Health education is the remedy, and the medical profession is responsible for this, which will remove heart disease from the high pedestal it now occupies as the one greatest destroyer of human life and human usefulness.

DISCUSSION (Abstract)

Dr. K. F. Maxcy, Montgomery, Ala.—The prevention of heart disease is undoubtedly one of the most important problems of preventive medicine today, as Dr. Townsend has so ably indicated. Because it is due to a group of causes, and not to a single cause or type of infection, it does not command so much direct attention from health officers as do the specific infectious diseases.

It is also true that there is much about the etiology of heart disease that is not well understood. A certain amount of progress has been made in the last few years, but as usual, our application of this knowledge in actual prevention lags.

Undoubtedly the largest group in early adult life and childhood is the so-called "rheumatic group." According to the modern conception this group is due to infection which localizes in the heart valves or the heart muscle. Just why certain strains of bacteria have an affinity or selective action on this particular tissue is not understood.

With the limitations of present knowledge we must concentrate on the infecting agent rather than on the resistance factor or factors. Obviously we are virtually powerless to prevent the entrance into the upper respiratory tract of various pathogenic micro-organisms capable of causing heart damage. We can, however, limit the damage done by micro-organisms which obtain a permanent foot-hold and set up chronic focal infection. I refer particularly to dental infections, and to chronic tonsillitis.

To secure a greater correction of defects of this type there is necessary, the establishment of more full-time county health units, the education of the public, the better training of physicians in routine physical examinations, and in the detection of focal infection, and better provision of medical service for those who cannot afford to pay, especially in the rural districts. Health education will help, but this problem, like most of the problems of preventive medicine, is inseparably connected with that of medical service to all people irrespective of their ability to pay, or their place of residence.

Dr. Alexander S. Garrett, Weatherford, Tex.—There are three causes that I wish to emphasize, in reference to public health education regarding heart disease. These causes in the main, all come under the head of intemperance.

The first cause that I will mention is intemperance in eating and insufficient exercise. Many people eat heartily of rich fattening foods, neglect to take sufficient exercise, become very much overweight and as a result develop a weak heart, which frequently terminates in apoplexy and sudden death, or a longer or shorter affliction with paralysis.

Alcoholic drinking, as is well known, is another cause of heart disease. While we have or should have national prohibition, there still exists in the minds of many people the thought that whiskey of some kind is a medicine or rather that it is both a medicine and a public necessity for the happiness and general welfare of the human race. Probably a large number of people who used alcoholic drinks before prohibition became a national law, are still trying to keep up the habit by buying and drinking the more poisonous stuff known as "bootleg" liquor. The general public still needs education on the evils and dangers of alcoholic drinking.

But in all probability the most common and frequent cause of heart disease at the present time is the increased use of tobacco in smoking. The use of snuff should also be included, but the smoking habit is the worse. All physicians who have informed themselves know that tobacco, that is the active ingredient, nicotine, is a heart poison. Not a few physicians themselves are falling by the wayside and many of them being cut down in active life by the excessive use of tobacco. For a number of years I have been obtaining reports when I could, of sudden deaths of men that are reported in the public press. So far, with very few exceptions, those that are reportel to have died suddenly have been excessive smokers. The sudden death of a physician aged 45 at the New Orleans Polyclinic was reported in the *Journal* of the *American Medical Association*. I was informed by a fellow physician who lived in the same town in which the doctor who died lived that he was an inveterate cigarette smoker.

The World War is largely responsible for the great increase in this injurious habit handed down to us from the uncivilized Indians.

This tobacco smoking habit is going to undermine seriously the health and morals of this and future generations unless it is checked. Physicians must set the example and publicly teach the people to turn away from this giant evil that is threatening the human race.

SYMPOSIUM ON CANCER

ETIOLOGY OF CANCER*

By CHARLES W. DUVAL, M.D.,
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The question of tumor etiology has occupied the close attention of medical scientists for many years, and theories too numerous to mention and some new facts which support more strongly certain well known views of cancer origin, have evolved out of the research up to the present time. However, it may be said in advance that little yet is definitely known of the essential cause of cancer.

There are a number of predisposing factors that bear relation to the development of this peculiar form of cell proliferation, at least they have long been known to be intimately associated with the beginning of neoplasia, and constitute a separate department of the etiology of tumors. Predisposing factors, acting as non-specific cell irritants, are well recognized causes, none of which, however, can possibly be the vital intrinsic property that characterizes the neoplastic growth.

The tissue reaction to an injurious agent, particularly the proliferation of repair, may be regarded as a common precursory cause of cancer. Disturbances of internal secretion and misplacements of embryonal cells are also regarded as forerunners of the tumor process. Severe injuries, such as blows, are said to predispose to neoplasia, if not to the carcinomatous certainly to the sarcomatous type. However, as thousands of these injuries are not followed by malignant formations it may be questioned whether the connection is not accidental. Likewise x-ray, radium and various parasites have long been held associated with the early growth of cancer. These factors, too, are predisposing and indirect in their relationship by virtue of the inflammation excited, which forms a transition between the injury and the development of neoplasia.

The theory that cell irritation from without is a precipitating factor in all neoplasia, was promulgated by Virchow as early as 1855. He regarded irritation as responsible for the aberrant activities of neoplastic tissue proliferation. The views expressed later by Cohnheim and Ribbert regarding the cause of cancer were based on the Virchow irritation principle. The various irritants, chemical, mechanical and thermic, according to these old masters, may act singly or in combination in the production of malignancy. Even today in the light of the most recent researches, irritants are still held essential factors though only as inaugurators of the change in the physiology of the cell. It would seem that nothing new of late has been advanced to shake our faith in the view expressed long ago by Virchow, namely that the etiology of cancer is the malignant cell per se.

Of the many theories that have been advanced to explain the origin of neoplasia there are two that deserve special mention and analysis. One has as its basis an intracellular parasite, acting in conjunction with a cell factor; the other, a permanent altered cell physiology which is inaugurated by abnormal environmental conditions. Of course there is little that is new about either of these theories; however, they are again very much in the foreground of cancer etiology because of the results that have been obtained experimentally. Quite recently the London workers have revived our interest in the parasitic theory, and Carrel on the other hand, in the non-infectious nature of malignancy. Stimulated by the work of Peyton Rous, Gye of the London Medical Research Council, has made an extensive study of malignancy, reporting the finding of two factors in cancer which he regards as intimately, though collectively, concerned in its production, one a "non-specific living virus," and the other a "specific chemical substance" produced by the tumor cell which he calls the intrinsic factor. Reporting carefully controlled experiments he claims that a living virus resides in the cells of malignant tumors; however, he does not explain satisfactorily the action of these two "substances" in the causation of the all important metamorphosis that is characteristic of malignancy. We might infer that Gye's intrinsic factor acts opsonically with his non-specific living virus in order to account for the symbiotic action, which he stated is essential in the production of cancer.

The microbic nature of Gye's non-specific factor is not proved by the *in vitro* cultivation experiments of Barnard. In the light of Carrel's work in "tar" malignancy, it is more logical to regard Gye's non-specific living virus

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in the category of an inanimate predisposing factor; and his specific intrinsic substance either as a latent viable moiety of the tissue cell or a living virus. The weak point in Gye's claim is the non-specificity of his tumor parasite. The existence and strict specificity of his intrinsic factor is more readily understood and appreciated.

In regard to Gye's belief in a tumor virus it is not consistent with our knowledge of intracellular parasitism to conceive of such a "Punch and Judy" tissue cell phenomenon. Might not this specific filterable tumor substance which the American authority, Peyton Rous, has always referred to as an "agent," represent some inate vital portion of the tumor cell, capable under certain abnormal conditions of environment of regenerating the parent tumor in kind? In support of such a hypothesis I need only mention the well known animal cells in which we have long recognized this particular function: for example, the trypanosomes and leptospiras possesses the property of regenerating their kind from a filterable and invisible vital fraction.

Quite apart from the fact that certain well known parasites excite tissue hyperplasia which histologically may be indistinguishable from true neoplasia, the conception of a specific intracellular cancer virus, capable of causing cell multiplication through irritation, is not only possible, but highly probable. However, it is not likely that parasites are the specific malignant principle, at least of mammalian neoplasia, Gaylord's fish malignancy being the only exception.

If we recognize that neoplasia is an expression of a new intrinsic property of the cell which has been acquired through adaptation to an abnormal environment, or through excitation by some one of a variety of detrimental factors, an intracellular parasite would merely be in the category of a non-specific predisposing cause of tumor development. Through the analogy of ordinary parasitism the fulfilment of certain postulates have come to be recognized in order to establish a causal relation for a hypothetical cancer parasite. It must enter and multiply in the host cell from which it derives nutrition and protection. Furthermore, we assume that while the parasite sojourns within the cell it causes irritation sufficient to provoke cell division, or that the parasite may through irritation and starvation of the cell cause the latter in the course of time to manifest the neoplastic proclivity. In spite of our fixed views regarding parasitism if tumors are caused by intracellular parasites, we must be prepared to find them quite different from any which we now know, and capable of producing tissue reaction quite af variance with all the laws of normal tissue reaction to injury. Certainly a tumor parasite would not necessarily have to behave in the cells like known parasites, nor would it have to conform biologically to recognized micro-organismal species, in order for us to conceive of its causing neoplasia. I do not believe that anyone nowadays regards some living parasite as the only specific factor in each and every cell mitosis of tumors. It is possible for a highly specialized virus to cause cells to divide after it has taken up its residence within the cell. It is also possible for such a virus to perpetuate itself by passing into, and traveling with, the newly formed tumor cells. However, it is improbable that a virus brings about that aberrant change in the function of the cell which remains a permanent cell property.

Again reasoning from analogy, it is not difficult to conceive of a specific parasitism for the different kinds of neoplasia, and an intimate affinity for the special cells which the parasite invades and inhabits. As familiar examples may be mentioned the leprosy bacillus versus connective tissue cells, malaria and the red blood cells and rickettsii and the endothelial cells. In each of these the parasite bears an intimate relation with a particular tissue cell.

The neoplastic cytotoxin shown by Lambert and others to exist for certain neoplasias could be the product of the metabolic activity of an intracellular virus. On the other hand, it could just as well be a cell protein of the tumor elements. While in either event the "substance" could be antigenic, its occurrence, however, in neoplastic tissues is no evidence of its microbic origin.

If we accept the parasitic etiology for cancer it is extremely difficult to explain the ability of the cells to metastasize, survive and multiply in the new areas, while the cells of benign tumors have none of these properties. To account for these differences we would be obliged to regard the parasite simply as one acting in the capacity of an irritant, which in the case of malignant growth has more severely disturbed the cell chemistry than it has the benign varieties. In other words, we must regard the parasite as a non-specific excitant, and merely the agent that precipitates the tissue transformation.

The phenomena of tumor metastasis show that the formation of secondary growth depends upon the transportation of the malignant cell

to a new site. The daughter nodules are seen to develop from these transported cells, reproducing the type of tissue which makes up the original tumor. Such vital activity of cancer growth is totally different from anything of its kind seen for the metastasis of infections. When on the other hand parasites that are capable of exciting proliferation, are lodged in metastatic areas the host cell multiplication is derived entirely from the tissues in which the metastasis occurs. In the case of cancer metastasis, the invading cells are opposed by the tissues invaded. Certainly it is thinkable for a highly specialized intracellular parasite to be transferred from parent tumor cell to offspring during mitosis. Assuming that all malignant cells are sick, it does not follow that division cannot occur before complete retrograde metamorphosis. On the contrary, we would expect sick cells that carry within a parasitic irritant to divide, and divide more rapidly and amitotically.

There is abundant evidence of microbic tissue selectiveness which results in abnormal cell division, for example the cell proliferation in leprosy, Rocky Mountain spotted fever, etc. In these instances the cell response is the result of the living parasite acting from within the host cell. The essential difference between the cell reaction of these well known infectious tissue proliferations and those of neoplasia is in the growth metastastic property of the latter.

While there is no proof as yet to support the view that cancer is caused by some living obligate intracellular virus, the work of Gye and Barnard in this connection is of interest, and undoubtedly deserves our careful consideration since it sheds some new light upon the old parasitic theory. Furthermore, the recent discovery appertaining to filterable viruses, particularly the cultivatable "globoids" of the group, has occasioned renewed efforts to determine a virus etiology for neoplasia. The experiments of Rous, Carrel, Loeb, Maximow, Burrows as well as Gye and Barnard, give us new facts to ponder over. While Gye and Barnard claim to have succeeded with the *in vitro* cultivation of certain malignant tumor viruses, and advanced what, in their opinion, is proof that cancer is caused by a specific living agent, Carrel on the other hand, states that his recent experiments with "tar" tumor leaves no other deduction than that cancer and other malignant growths are non-infectious in origin.

Some of the most significant work of late in connection with the etiology of cancer, is that of Carrel with the filtered extract of the McFaul "tar tumor." This most careful investigator claims that the cell-free extract of tar sarcoma will cause the development of this malignant growth when injected into the normal living host. He also claims that the extract produces striking transformations of normally growing mesothelial tissues *in vitro*. Carrel's results are far reaching in their significance because they in no manner support the infectious theory held by some for the Rous sarcoma, which has afforded our best example of a likely parasitic origin for tumors. It would seem that the extract of tar tumor produces all the phenomena occasioned by the filtrate of the Rous sarcoma.

Even though we accept Carrel's deductions that the active filterable substance of these two malignant growths are non-infectious, their real nature still remains undetermined except in so far as they are "specific" filterable substances which originate from the tumor cell. Assuming that they are not living viruses, how can we explain their animate properties? In this connection I would again bring to mind the fact that the trypanosomal cell can reproduce itself from an ultramicroscopic portion.

Carrell likens the behaviour of the specific tumor filtrates to the bacteriophage of d'Herelle, in that they possess the power of determining a special disease and eventually death of the sick cells, at the same time reproducing themselves indefinitely. In this connection it should be mentioned that the Twort or d'Herelle phenomenon may be caused by a living virus.

In explanation of the occurrence of spontaneous malignant tumors, particularly those occurring after middle life, Carrel thinks they might be due to various non-specific proteins circulating in the blood, and acting upon certain cells in a manner similar to that of tar and other non-infectious substances which are known to produce malignancy. It is pretty well agreed that all malignant cells are sick, and eventually die. Now in order to account for metastatic growth of tumor cells in a heterologous tissue environment we must assume that the transported sick cells reproduce themselves before dying; and in the new tumor cells the malignant property is passed on by inheritance and perpetuated. If this non-infectious specific property of malignant tumors is discharged from the cells originating it, at or before the cells succumb, we would expect to see malignancy developing in the normal homologous tissues throughout the host. Such, however, is never the case, and the point in question supports the view that

malignancy, after all is said and done, is an inherent vital property of the cell.

Since all neoplasias are structurally and functionally atypical the question naturally arises, how have they come by these peculiar properties. There is abundant evidence now that this property is specific and acquired through a variety of non-specific extrinsic factors. Any condition which will bring about a partial or complete separation of cells from the parent mass is a factor in the subsequent vital alteration of those cells. Such cells by virtue of their new environment are likely to suffer nutritionally, and as a result acquire neoplastic proclivities. Again normal cells may be injured while they are a part of the parent mass through the direct action of some extrinsic thermal, chemical or mechanical agent which acting as a "whip" inaugurates the malignant property of cells. Thus through such non-specific factors the origin of neoplasias both benign and malignant can be accounted for. The same factors might also explain the occurrence of tumors arising from embryonal "rests" and the activities of latent sex cells to form teratomata and dermoids.

In conclusion I would say that the consensus of opinion among pathologists, which is based upon new experimental data, is that cancer is the result of a change in the physiology of the cell which when once established occasions the cell to grow regardless of the environment and independently of the original exciting cause. Neoplasia, as pointed out long ago by Virchow, is perhaps after all, the result of an aberrant function of the tumor cell which has become a permanent hereditary feature, passed on by the parent cell through some vital portion of itself. If intracellular viruses play a part in the etiology of malignancy it is probable they do so in the role of a cell irritant, and analogous to that of well known non-specific substances.

Gye's "intrinsic tumor factor" and Carrel's "specific tumor filtrate" appear to be identical. If these "filtrates" could reproduce independently the homologous tumor elements in an *in vitro* cell free medium it would still not prove its non-infectious nature. Furthermore if these "specific tumor filtrates" are not living viruses, we can account for their animate property only upon the theory of a transcended vital fraction of the tumor cell which is analogous to that of the trypanosomes.

Finally, we should not lose sight of the fact as pointed out by Leo Loeb, that cancer is the result and not the cause of the changes in the growth energy of tumor cells.

STUDIES OF THE CAUSE, PREVENTION AND TREATMENT OF CANCER*†

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It was my pleasure to present to you for the first time in concrete form my results of the study of the growth of body cells which lead to an explanation of cancer.[1] It is now my pleasure to present to you further researches along this same line which indicate that cancer may be classed among the diseases due to vitamin imbalance and that it may not only be prevented, but may be treated as such with certain grades of success.

As I pointed out in the previous paper it has now been shown that cancer may be induced not by one but by a variety of very different substances and conditions, such as coal tar, other lipoid solvents, x-rays, radium, certain animal parasites, bacteria, and other chemical substances. In man, cancer may also follow on old chronic inflammatory processes, atrophy of tissues and congenital tumors and defects.

While the various substances and conditions outlined above are important in inducing cancer, they are not important for its subsequent existence. Cancer may be induced in animals by repeatedly painting or injecting an area with coal tar. In these cases the coal tar is necessary for the induction of the cancer, but not for it subsequent course. As soon as the cancer is induced it proceeds independent of the tar. Many such cancers have been transplanted to other animals and have continued to grow after each transplant long after the tar had disappeared. The same is true for cancers developed by animal parasites, x-rays, radium, bacteria, etc.

Cancer is not the result, therefore, of any specific substance, bacteria or otherwise as certain American and English authors have attempted to show, but merely the result of some primary change either in the cell or its immediate environment. This change is brought about as noted above by any one of numerous substances and conditions. The change releases the cells from the subjugation of the whole and allows them to revert to their primitive growing state. These cells then grow at the expense of the other differentiated cells of the organism.

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As pointed out in previous papers [1] [2] we have found that an active independent growth of body cells will take place in a tissue culture only when the cells are crowded into a small mass of blood plasma (the normal body fluid) or in any simple synthetic medium free from tissue juices. This growth demands the presence of oxygen. It does not take place at once, but always after a given latent period. It can be stopped by separating the cells, agitating the medium or washing the culture with a stream of serum.

When these same cells are separated in the same drop of medium they show no growth, but migrate apart and show changes peculiar to their differentiation in the body. Function appears when the cell is placed so that one end is bathed by products from a mass of cells and the other end is free from these products. This is true not only for one but for all types of contraction, secretion, nerve conduction, etc., the type of function being dependent on the type of cell suffering such polarity. The nerve cells are stretched between the dense brain tissue and an end organ; the gland cells are stretched between a stagnant duct where substances may accumulate and a rich vascular supply without.

In analyzing for the chemical significance of these facts it was found that these conditions of stagnation, cell crowding and oxygen are important for the growth of the cells, because this growth depends on the accumulation of a substance or substances formed when the cells oxidize certain food materials. This substance or substances has been called the archusia (S). It is soluble in body fluids. The cell has no means to retain it. Its concentration is dependent, therefore, on the number of cells forming it and its means for escape from about the cells.

This substance can be readily extracted and its activity tested on completely isolated and inactive cells in the medium. In previous studies it has been shown that when cells are separated in the medium so that their archusia cannot accumulate, they become inactive. In studying the effects of extracts containing the archusia on such cells, it was found that low concentrations S^1 of the archusia have no effect. In medium concentrations S^2 the archusia (S) stimulates the cells to migrate into plasma clots, to take up particles of protein and small fat droplets and to migrate and accumulate about larger fat droplets in the medium. During such migration the embryonal cell shrinks in size and stains more deeply. It suffers changes peculiar to the differentiation of the cell in the organism.

The connective tissue cells lay down intercellular substances under these same conditions and the cells function when this concentration S^2 is localized at one of the cells and the same archusia (S) is allowed to escape from the other end as it is formed.

Only in high concentrations S^3 of the archusia do these cells digest the proteins and fats within and about them, absorb water, grow and divide by mitoses.

In all concentrations higher than S^3 these cells are digested and destroyed by the archusia. These higher concentrations have been designated as S.[4]

Applying these facts to the animal organism it became evident that the changes which the cells suffered in normal development, maturity and death in the organism must be only the result of their gradual separation and the development of the blood vascular system, which regulates the distribution and concentration of the archusia at all times.

Cancer deduced in the same terms may be nothing more, therefore, than the result of a local crowding of cells and a relative decrease in the circulation about them. Under such conditions the cells should form and retain sufficient archusia for their independent growth.

It is known that cancer has such a stagnant organization. In proof that this organization is the important factor in this disease, it was found that such a crowded organization of normal cells can destroy the cells and blood vessels in normal tissues about it. They can invade the normal tissues as cancer invades the organism. Cancer cells placed in less crowded environments return to the type of the differentiated cells. The substances and conditions noted above as capable of inducing cancer act only to build such a tissue organization. Drops of coal tar placed in the tissues accomplish this act by drawing the cells from the surrounding tissues away from their blood vessels and crowding them about themselves.[3] Bacteria and animal parasites liberate growth stimulus and induce an active proliferation of cells without the formation of blood vessels.[2] X-rays, radium and ultraviolet decrease the vascular supply and stimulate the cells to grow to form dense stagnant masses.[4] As these masses of cells increase in size they are eventually able to form and retain sufficient archusia for their independent growth.

In the light of these facts it became evident, therefore, that cancer is nothing more than the result of a crowding of cells and a reduction in

their blood supply. These factors are important because under such conditions and only under such conditions can the cells form and retain sufficient archusia for their growth. The normal development of the animal is the product of the development of the blood vascular system and the destruction of the stagnation necessary for an independent growth of the cells. Body cells are not different, therefore, as far as their growth reaction is concerned from other cells in nature. It is in the stagnant pool and not in the running stream that unicellular life abounds.

In studying the juice or fluids squeezed from cancerous tissues we have found that it contains an S^3 and S^4 concentration of the archusia. In the peripheral regions of the cancer the cells are bathed by an S^3 concentration. They grow and divide. In the central regions the archusia reaches a higher concentration (S^4). The cells suffer a self-digestion in this region.

While these observations were interesting, it was more interesting to note that the normal functioning tissues of the body, the growing bone and connective tissue of older embryos and adults, do not always contain the S^2 concentration of the archusia necessary for these acts in the cultures. Again it was noticed that the cells which are functioning and the connective tissue cells laying down intercellular substances under an S^2 concentration of the archusia in the cultures become exhausted and inactive within a few hours or days. It was found that the shrinking of the cells in their differentiation, the laying down of intercellular substances by the bone and connective tissue cells, the absorption of fat and protein particles and function depend on the liberation by the cell of a soap-like substance, which has been called the ergusia. Under an S^2 concentration of the archusia the cell liberates this soap-like substance, but does not form it. The cell suffering such conditions becomes exhausted of this soap in a few days. This substance is absorbed by protein and fats. It is an active blood coagulant. The extracellular fibrils of connective tissue and the matrix of bone are extracellular proteins coagulated by this substance. Fat absorbed by the cell becomes saturated with it. It is used continuously in the performance of function.

While it is evident from the above observations that the ergusia is used extensively and continuously in the organism during its life, there was no evidence that the cells formed this substance under the conditions existing in the normal body. The ergusia is a product split off from protoplasm. It is formed only when the cells grow. The question arose, therefore, were our deductions of cancer and growth correct as we had outlined them above, or did the organism obtain a supply of the archusia (S) and the ergusia from outside sources. It has now been shown that the body cannot exist alone on proteins, fats, carbohydrates, salts and water, but other accessory food factors are also necessary. These accessory factors have also been called vitamins. The chief of these vitamins are *A* and *B*. They are necessary for the development of all higher forms of life. *A* is fat-soluble and thus has properties similar to the ergusia of cells. *B* is water soluble and has many of the properties of the archusia (S). It was possible, therefore, that the ergusia and archusia necessary for the life of the differentiated organism was supplied by other growing cells in nature.[5]

Jorstad and I have studied this problem carefully and have found that vitamin *B* is probably nothing more than the archusia (S) formed by other cells in nature.[5 6] The ergusia lost to the functioning cells, the connective tissue cell laying down intercellular substances, storing fat and other differentiated cells of the organism, also comes from the same source. Archusia is formed by all living cells to a certain extent. It is widely distributed, therefore, in nature. The ergusia on the other hand is a part of the protoplasm of cell. It is formed, therefore, only by growing cells. Jorstad in a series of experiments carried on recently in the laboratory has shown that coal tar added to the tissues removes the ergusia from the cells.[7] This causes them to be drawn to the tar and leads to their deterioration. In another series of experiments he finds that this may be replaced and the cells protected from the action of the tar by feeding the animal ample quantities of vitamin *A*. Rather small doses of coal tar injected subcutaneously cause cachexia and death in rats. These symptoms and the death can be prevented even when much larger doses of tar are given if the animal be fed a diet rich in butter fat or cod liver oil.

In a recent, yet unpublished series of experiments,[8] we have sought for the source of this vitamin *A* in nature. In these experiments it has been possible to show that it is liberated primarily when bacteria are broken up in the presence of a high concentration of their archusia. It is liberated when the cells break down in the presence of an S^4 concentration of this substance. It is liberated in flasks of medium when the bacteria overgrow the medium and are

destroyed in it. It is a product of decaying animal matter in nature. It is interesting that these same bacteria fed during their period of active growth supply only vitamin *B* to the animal. The animal has no means to split the vitamin *A* from their protoplasm. This must be first liberated by an excess of their growth stimulus.

As shown above, stored animal and vegetable fats and intercellular substances of the body contain large quantities of the ergusia. Careful feeding experiments have shown, however, that few supply this substance to the animal when they are fed. This led to the belief that only certain animal fats are rich in this substance. It was soon found, however, that others treated with ultra-violet light become an ample source of it.

There is no evidence from these experiments that the ultra-violet light forms vitamin *A*. It acts only to liberate it from fats and animal matter so it can be used by other animals.

Cramer[9] has recently shown that cancer needs no vitamin *A* or *B* for its growth. Owing to the stagnant conditions of the environment and the densely cellular character of this tissue it forms ample vitamin *B* and retains it in quantities sufficient for its growth. In these high concentrations of the archusia or vitamin *B*, vitamin *A* is formed from simpler substances. Many other authors have shown that vitamin *A* is detrimental to the growth of bacteria. In recent attempts to treat serious cases of cancer, such as malignant melanoma and severe cases of leukemia, we have found that it has a similar detrimental effect on these independently growing tumor cells in the organism.

The reason for these facts becomes self-evident from the above observations. Vitamin *B* is nothing more than a substance formed primarily by cells when they oxidize food materials. Growth is the result of a certain concentration of this substance acting with the cell on proteins and fats, or even simpler substances of the food. As shown from the splitting of protoplasm with higher or lower concentrations of the archusia (vitamin *B*) vitamin *A* and the specific proteins of the cells are formed in this reaction of protoplasmic synthesis. Such organic reactions are known to be incomplete reactions. According to the law of mass action, the addition of any substance which is formed by such a reaction must slow or stop it completely.

In the light of these facts it became evident, therefore, that man owes his development and existence as a functioning organism to the simpler growing forms about him. Function is something which has taken place at the expense of the growth reactions of the cells and substances formed in this growth reaction. These are supplied to the functioning cells as vitamins.

Cancer primarily is only the result of the mechanical factors, stagnation and cell crowding. These factors are important because they allow the cells to form and retain ample archusia *S* (vitamin *B*) for their independent growth. Cancer viewed in the chemical sense is nothing more, therefore, than a local increase in viatmin *B*. In reviewing the substances inducing it in this sense it becomes evident that they produce this vitamin imbalance either in one of two ways: (1) x-rays, radium, animal parasites and bacteria liberate large quantities of vitamin *B*. In reviewing the substances inducnormal cells at the point where it is liberated. This overgrowth forms a densely cellular mass which when it becomes large enough can form its own archusia and retain it in quantities ample for its independent growth. Coal tar and other lipoid solvents remove the vitamin *A* from the tissues and drag the cells together. When sufficient cells are thus accumulated they become an independently growing mass.

Cancer is, therefore, something which must tend to arise in organisms suffering vitamin *A* deficiency. Barker[10] had already come to the conclusion that vitamin deficiencies must be a factor in cancer. He drew his conclusions from the study of case histories. How often we find in the history of individuals with Hodgkin's disease, leukemia and cancer, that they have suffered for long periods of time or most of their lives from an insufficient diet.

It seems evident from these observations that cancer is a disease that can be prevented by proper dietary measures and may be treated by these same means. In proof for these last contentions we have found that while it has been impossible to cure a malignant melanoma in a man already in cachexia from this disease, it has been possible to restore him to his former state of general health and keep him in a condition fit for hard work for a period of six months.

On admission this man had lost weight and appetite. He had a red blood count of 4,500,000 and a hemoglobin of 80 per cent. He was weak and thought himself unable to continue his work. We advised him, however, to continue working for a while at least. On a dietary of 3000 calories which contained large quantities of butter and cream and small amounts of brewers' yeast he returned in the course of four months to a state of normality. He has worked hard all summer and

up to the time he went east in September his cancer which extended from his head to fill the whole of the right side of his neck had not shown evidences of metastases to any of his organs.

An early case of spleno-myelogenous leukemia has also responded well under this treatment. Recently a late case of spleno-myelogenous leukemia has also been treated. The disease in this latter case was of two years and four months' standing. He had received x-ray and arsenic therapy during this period. He responded well until June of this year. Subsequent to this time he received doses of x-ray and continued to use arsenic. As many as 10 x-ray treatments given from August until September had no effect. When he entered the hospital he had 300,000 white cells, mostly myelocytes, 2,800,000 red cells, a spleen which filled the whole of the left side of the abdomen and crossed the midline. He was very weak and ill. His temperature was continuously elevated, going up to 104 in the afternoon. In this case and the other leukemia, we gave not only yeast and a vitamin *A* rich diet, but also vitamin *A* split from cultures of *Bacillus tumefacians*. A moderate amount of vitamin *B* was given in the form of yeast and young cultures of *Bacillus tumefaciens*. The patient has steadily improved under this diet and treatment until he has no temperature. Under this same regime and earlier blood transfusions his red cells and hemoglobin have steadily increased until he has 4,500,000 red cells at present. The spleen of the earlier case shrank under this treatment until it extended just below the costal margin. In the older case the spleen has changed but little. Whether the life, of either of these patients will be prolonged for any great period of time we do not know.

In the cancer cases it is possible to shrink the tumor with large doses of vitamin *B*. It has been impossible, however, to carry this kind of treatment very far. After large doses of vitamin *B*, not only the tumor but the patient suffers from its effects. According to our above observations an over abundance of vitamin *B* about the tumor should raise its archusia to an S^4 concentration and cause its destruction. A few animal tumors have been dissolved by this means. In each case these animals have suffered, however, from the treatment and a majority of them have died as the result.

While our attempts to treat cancer according to the analyses of its cause have not met so far with any startling results, it seems evident that by these means these cases can be kept active for a longer time than they have been up to the present time and that this disease may be greatly reduced by the dissemination of knowledge of nutrition and the development of better dietary products.

As must be pointed out here, the above observations also show that vitamin *A* and *B* are much more important for life than we had anticipated. They represent the energy of life and its transformation into the various kinds of work we perform.

Vitamin *B* is the stimulant or the source of energy for these processes. Vitamin *A* is the substance which transforms this energy into work. It is the growth inhibitor in the body. Cancerous tissue differs from the normal tissue in that it has a high *B* and a very low *A* value. The normal tissue has a high *A* and a low *B* value. It can function only as *B* is supplied to it from the outer world. Any thing which increases *B* at a point in the tissue or removes the *A* causes cancer. This change allows the cells to return to their primitive state. Culture of growing bacteria have a high *B* and a negligible *A* value. It is vitamin *A* which has made possible life as it exists in higher animals.

Many other diseases are also evidently only the result of disproportion in the balance of these vitamins in the body. We have been unable to find that the toxicity of many bacteria are more than an excess of vitamin *B* which they liberate during their growth in the body. Such is undoubtedly true of tuberculosis. We have also found that injections of vitamin *B* causes the degeneration of cells, fever and leucocytoses peculiar to many of these infections. It becomes evident, therefore, that a further knowledge of vitamins, their production and biological properties will not only be important in cancer, but for medicine in general because in this study hope for a rationalization of medical treatment becomes possible.

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PATHOLOGIC DIAGNOSIS OF CANCER*

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The diagnosis of cancer properly divides itself into two methods, clinical and pathological. Clinical diagnosis must be depended upon mainly in internal tumors, at least until a working diagnosis is established and it is decided to explore for the tumor itself. Hidden cancer must disturb function before it is suspected. It must produce symptoms upon which the primary study is based. This means that it is usually a frank or advanced tumor before we see it, in which case the value of pathologic examination is to some extent nullified but still of such potential service that no tumor should escape a thorough examination. The part played by the pathologist in clinical diagnosis has been practically nil until recently, but the invaluable service to be rendered by an experienced man in interpreting symptoms, x-ray pictures and other signs and tests, is receiving more and more recognition. The ability to visualize tissue changes, which are the foundation of tumor growth, necessitates preparation and experience which are possible of attainment by practically no one else. The role of the pathologist as a clinical adviser or consultant in all cases of suspected cancer is an important one and he should be practically routinely consulted where circumstances make it possible.

Pathological diagnosis signifies a diagnosis of the tumor itself. It consequently is more practically available and of more immediate value in tumors which are accessible to direct examination.

The responsibility which we face in tumor diagnosis and the exacting nature of the work are second to nothing connected with the treatment of disease. An incorrect diagnosis may, and often does, lead to an unnecessary mutilating operation, or to the loss of a life which might have been saved. The tremendous importance attached to the diagnosis of malignancy requires the most exacting skill of those who assume to make it. For the nature of these requirements I refer you to a previous review.[1]

The diagnosis of a tumor should properly be a common one between the surgeon (to avoid enumeration of those who treat tumors, I am using surgeon to include them all) and the pathologist, arrived at by consultation. It should not be the function of either alone, unless the surgeon is a qualified tissue pathologist. This statement, of course, challenges the propriety of the practice of a large part of those who treat tumors.

DIAGNOSIS OF FRANK TUMORS

The diagnosis of a frank tumor or of a growth which is frankly not a tumor is a matter of no great difficulty in the hands of a qualified surgeon or pathologist. However, frank conditions not neoplastic are often diagnosed tumors, malignant tumors are called benign and benign are called malignant. One sees a tuberculous testicle or the normal glands of the endometrium called cancer or the connective tissue of an ovary called sarcoma, while the differentiation of types of carcinoma or sarcoma is commonly not even attempted. While it is true that in competent hands a gross diagnosis is all that is needed, in such cases it often makes little or no difference whether the diagnosis is correct or not in so far as it influences the outcome. Broadly speaking, when a malignant tumor becomes so prominent as to make the gross diagnosis beyond question, of what immediate avail is the diagnosis?

DIAGNOSIS OF BORDERLINE STATES

It is not with frank and outstanding conditions that we need to be most seriously concerned, although one is occasionally astounded at a gross mistake here, but it is in the early stages of tumors and in borderline or doubtful states that we can be most effective, and it is here that the utmost skill and the closest co-operation are demanded. It is in these states that telling errors are made now, and commonly, by reason of lack of co-operation and lack of skill.

In present practice, in large part, the surgeon is all-sufficient in the frank case and the main or entire responsibility of the doubtful case is passed to the pathologist. There is not, with important exceptions, the close association of the two in all cases. The surgeon, either thoughtlessly or even, at times, intentionally, withholds information which is helpful or necessary for a correct interpretation, while the pathologist may be cocksure and over-optimistic about his abilities on the one hand or fearful of taking a stand on the other.

It is the impression of many that the microscopic picture of a tumor is characteristic, each for the name given, that each tumor has its own special cell and that all one needs for a microscopic diagnosis is to identify the cell. Nothing

*Chairman's Address, Section on Pathology, Symposium on Cancer, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

could be farther from the real. No two tumors, literally no two malignant tumors, are alike.

Another mistaken but common impression is that there is a characteristic appearance of the "malignant" cell, if I may use the term. Were this true there would be no reason for confusion of inflammatory growth with neoplasms, or benign with malignant tumors. As a matter of fact the most difficult phase of the problem lies in the borderline states, where chronically irritated, chronically inflamed tissue passes or does not pass into neoplastic growth. Speaking in terms of medical practice, by and large, and in the broadest sense, the most of our cured cancers and sarcomas were never cancers or sarcomas but were inflammatory growths in which distortion of structures was so pronounced as to lead to the mistake in diagnosis.

THE PRECANCEROUS STATE

Is there a sort of no-man's land between inflammatory disarrangement, intercellular and intracellular, and tumor growth? The answer depends largely on preconceived ideas of the immediate cause of cancer and the essential nature of the tumor cell. Speaking in the strictest sense, there can be no such thing as a precancerous state, that is, one definitely separated from the state when cells have not the power of ungovernable growth. Tumors are built of essential cells and there is a time when these cells have not the qualities to become malignant, and there is a time when they acquire these qualities. They are either the one or the other and the transition must be, in a sense, abrupt. In other words, in the new growth of tissues, a cell is either subject to the laws of limitation of the organism or it has escaped such limitation. What happens to cause the change is the mystery of cancer, but there can be no precancerous condition in the meaning of an intermediate phase between these states. The term precancerous indicates to me that troublesome phase when disarrangement of cells has proceeded to the point when it appears that they are likely to escape natural limitations and to become malignant tumors. It does not mean that they will necessarily become malignant. It is merely a danger signal. The condition is definitely not malignant and undoubtedly in the majority of cases will not become so.

It is here that the inexperienced and the uncertain will err. It is a natural instinct to play safe, and it is my observation that the pathologist, feeling the burden of a great responsibility, which he may be facing more or less alone, will err toward the side where there is the least likelihood of a "comeback," whereas in close co-operation with the surgeon and with close knowledge of the clinical state, courage will bolster his judgment and eliminate the handicap of fear.

QUICK DIAGNOSIS

Another human failing which plays a part in tumor diagnosis is the love of the spectacular. The pathologist has his inning in the limelight when he stands before the audience, even if it is only the operating staff, to make a rapid frozen section diagnosis. Frozen section diagnosis has its place and it is of use at the operating table. In the hands of all except the most experienced, however, it is a dangerous thing and it often falls in the same class as the operation performed against time and through an insufficient incision when neither is necessary or wise. When frozen sections are most apt to produce a correct diagnosis in a few minutes is when they are least needed, and when a microscopic diagnosis is most needed is when deliberate study is necessary. In many instances, were I the patient, I would prefer the risk of a second operation to that attending a quick frozen section diagnosis. Here again, close cooperation and confidence between surgeon and pathologist will go far toward preventing mistakes. The pathologist must be unafraid to advise when a quick decision would be unwise or even when simply a gross examination would be more dependable, as, in my, opinion, it often is, and the surgeon should have the confidence to respect such a judgment.

DIFFERENTIATION OF TYPES

It is no longer sufficient to name a tumor benign or malignant, carcinoma or sarcoma. The exact differentiation of types is necessary, not simply for purposes of study, but immediately for purposes of outlining treatment. As we learn more about the relation of the type of tumor to the kind of treatment minute differentiation will become more and more important. One type of cancer may submit to a particular treatment, which may have no influence on another. Differentiation is also intimately bound up with expectancy and prognosis. Gross differentiation is largely guesswork. While we can foretell the type of a tumor by gross examination in many cases, certainty attends only microscopic study. Here again we may say that, in the treatment of tumors, when gross differentiation is sufficient it usually makes no difference whether it is correct or not. When exact differentiation is of value in treatment it must be microscopic.

GRADING OF MALIGNANCY

The grading of malignancy is no new thing. It is as old as the present conception of the nature of malignancy. The division of malignancy into a definite number of grades cannot be exact, although it may be practically useful. It is comparable to grading nephritis or any other disease and is as subject to pitfalls. At best it is anatomic and, even at that, there can be no line of division between any two contiguous grades. Whether we use a figure or a word to indicate the probable degree is immaterial so long as it is understood. In judging the degree of malignancy one must be clearly familiar with the cell of origin, since the departure from type, the relation of the tumor cell to the mature parent cell, is the evidence upon which grading is based. This is one of the reasons why it is essential to know the site of origin of a tumor particularly, since it is often impossible to determine from the detached tumor, a condition not fully appreciated by many surgeons and not sufficiently respected by many pathologists. Common errors are due to inattention to this important detail.

NAMES OF TUMORS

The naming of a tumor is an important thing. The pathologist who makes a diagnosis should be certain that the surgeon understands the term. The classification and nomenclature of tumors is in a state of confusion at present, primarily on account of the state of our knowledge, and not much is yet to be accomplished in permanent form. The more familiar I become with tumor practise the less importance I attach to making a name diagnosis and the more inclined I am to use descriptive terms which will be better understood.

MATERIAL FOR STUDY

Not the least in importance in making a correct tumor diagnosis is having suitable specimens and knowing the proper method for handling each. When a specimen is unsuited for examination the pathologist harms himself as well as the patient by not saying so. If a biopsy is to be done a representative section of sufficient size to be handled conveniently should be taken. From a suspicious ulcer, for instance, a section from the growing periphery of living tissue is best, not a specimen pulled from the necrotic surface, often of pinhead size, such as is commonly submitted.

As to biopsy, it has its place. In case of a suspicious surface, or accessible, growth or ulcer where the performance of a difficult and mutilating operation hangs on the question of malignancy, there should be no hesitation. A localized tumor, such as may be in the breast, had better be taken in its entirety and then sectioned rather than incised *in situ*. Each case should stand on its own merits regardless of the dogmatic condemnation of biopsy by some. A clean cut incision should give no reason for additional danger of spreading since the flow of fluids is outward and when it stops the channels are clogged with clot. The experiments of F. C. Wood,[2] showing that incision did not produce apparent increase in metastasis but that massage did, should go far toward allaying the fear of biopsy and should direct that fear to the common practice of unlimited handling of tumors.

The propriety of the practice of curetting the uterine lining for diagnostic purposes may be questioned. It must be recognized that a tumor may be present and none of it obtained in the scraping, while the bits of material secured are difficult to handle. From the trouble which many pathologists seem to have with uterine scrapings I am bound to say that a positive diagnosis of cancer of the uterus made from scrapings must come from a source beyond question to produce conviction. On the other hand a negative finding does not eliminate cancer. Recently while visiting a hospital laboratory I inquired about tissue methods and was informed by the pathologist that he did only frozen sections. When I asked about uterine scrapings I heard that they, too, were frozen. Perhaps, under the circumstances, it was just as well.

Finally, in the presence of our lack of knowledge of intracellular characteristics of tumor cells, probably the least said about detached cells, cells in fluids, etc., in the diagnosis of tumors, the better. Only a few days ago I saw a report of an examination of urine which went into detail with arguments as to whether the epithelial cells present were cancer cells and I wondered whether importance had been attached to it. Pathologists will increase the respect given their opinions by keeping their heads above water in such matters and by frankly recognizing limitations which cannot be escaped in our present knowledge.

CONCLUSIONS

Summarizing this general review of the status of pathological diagnosis of tumors let me say that in closer association and cooperation be-

tween clinician and pathologist and in the establishment of greater confidence between them lies the opportunity for greater service in tumor practise than is now generally given. The betterment of methods for handling tumors has not received the general attention which it should and tumor practise, by and large, does not show the improvement which is believed to be possible even under existing conditions. Every effort of the practising profession should be exerted toward better diagnosis and no tumor should escape the most thorough examination.

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The Dallas Medical and Surgical Clinic

PREVENTION, DIAGNOSIS AND TREATMENT OF CANCER IN ITS EARLIEST STAGES*

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PREVENTION OF CANCER OF THE SKIN

There is every evidence that cancer never begins in a healthy spot on the skin. There is always something there first: a congenital mole, pigmented or not; a sub-epidermal basal-cell nodule (rodent-ulcer cancer) which may appear at any time in life, a wart, a scaly area, or an unhealed wound. The majority of people pay little attention to such skin defects, and few of the profession can tell the dangerous kinds any more than many people can select the edible mushrooms. But if we educate adults to report to their family physician with these congenital or acquired skin defects and if we teach the medical profession how to recognize the dangerous kinds and how to treat the little skin defects, cancer of the skin can be prevented, or, if present in its earliest stages, cured. All large pigmented moles or prominent moles and all moles situated in areas of irritation, and all warts, except those common on the fingers and toes, should be excised properly with the knife or cautery. They should be removed with sufficient margin, so that if the microscope shows beginning malignancy, nothing further will have to be done.

Then there is the scaly area, the little area of keratosis, or minute wart, the persistent pimple, which is frequently the beginning of cancer. These areas are often due to dirt or improper protection and cleansing or to an insignificant abrasion of the skin. On the little area whose epidermal covering has been partly destroyed dirt accumulates, scratching and infection add to the chronic irritation, and after months or years cancer develops. When the people are instructed in the first treatment of these little abrasions, cancer will never develop. When your patients report to you in this early stage, do not resort at once to knife or cautery, x-ray or radium, but resort to cleanliness and protection. Teach the patient how to wash the area with hot water and soap, cleanse it again with alcohol, and protect it with petrolatum.

If the area does not heal, then excise it. I am very familiar with this early stage which precedes cancer, because I have excised many and have found no histological evidence of cancer. Now I have many cases which have healed under this simple treatment. Lesions of this type on the nipple lead to Paget's cancer (see my report in the *Archives of Surgery*, 8, p. 461, March, 1924).

If there is any doubt as to the nature of the skin lesion, excise it. There may be some difference of opinion in these early cases between the value of radiation as compared with complete excision. My own experience favors complete excision with the knife or cautery. Biopsy is never necessary when the lesion is small, only when the lesion is large and its complete removal would be a mutilating operation. When the skin defect proves to be a carcinoma spinocellular (squamous-cell epithelioma) then comes up the question of removal of the neighboring lymphatics. It is my opinion that this is wiser when the lesion is near the groin or the axilla or the neck. There is not space in this paper for a full discussion of this question.

It is out of the question in these few sentences to discuss cancer of the skin, but unfortunately, in the publications of the past, much space has been devoted to the diagnosis and treatment, of the late stage of cancer of the skin which is an unnecessary disease and, to repeat, is due to ignorance and dirt. Now is the time to educate the public to report at once with insignificant skin defects, and to teach the profession how to recognize the kind that should immediately be removed, also to teach them when and how to employ the soap-and-water, alcohol and petrolatum prophylaxis.

*Read in Section on Pathology, Symposium on Cancer, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

PREVENTION OF CANCER OF THE MOUTH

The etiological factors which produce cancer in lesions of the mucous membrane of the lip, tongue, floor of the mouth, gum, cheek, palate, are apparently identical: the chronic irritation of tobacco in all forms, including snuff, and ragged, dirty teeth, badly fitting plates, neglected pyorrhea, and unhealed sinuses from unextracted roots. Any factor which will abrade the mucous membrane of the mouth and prevent the healing of this lesion may produce a local condition in which cancer may later develop. In 1921, when I reported on cancer of the tongue as a preventable disease, I called attention to the fact that cancer of the tongue was rarely, if ever, seen in men and women who did not use tobacco. There are a few exceptions to this rule, but tobacco is the most prominent factor in all cases. The next is teeth. Individuals under the care of good dentists rarely develop cancer of the mouth. As a rule the first lesion due to irritation by tobacco is leucoplakia. In the majority of instances, the patient has seen the white spot, and has known of its presence for years. Leucoplakia apparently is not painful. In fact, the smoker's mouth, with or without leucoplakia, is a benumbed area. This explains why smokers demand highly seasoned food.

This also explains why without pain in a few cases an area of leucoplakia cracks, forms an ulcer and then cancer develops, or in the area of leucoplakia a wart begins to grow, insidiously develops into cancer at its base, and then a cancer-ulcer or fungus blooms. In all these pathological changes from the benign leucoplakia to the fully developed cancer there may be little or no pain. In many more instances the patients are aware of the leucoplakia and the irritation by a tooth or teeth, but they pay no attention to the local lesion until it is a fully developed cancer. Since my publication in 1921, I have restudied all the records of lesions of the mouth, and compared the new experience gathered in the past four years. The conclusions of that paper in 1921, that cancer of the tongue is a preventable disease, may be extended to all of the oral cavity in front of the anterior pillars of the fauces. In the first place, adults should maintain clean, smooth teeth. It is one of the most important factors in the prevention of many diseases and the maintenance of good health. Those who use tobacco should be more careful about the care of their teeth than those who do not. Our recent experience forcibly teaches us that whether the individual uses tobacco or not, the lesion of the mouth which may later develop into cancer will be known to that individual before cancer develops. The exceptions to this rule are certainly less than three per cent, and further education may eliminate even this.

In my own practice, late cancer of the oral cavity has decreased from more than fifty per cent to less than ten. When we educate the public to seek an examination the moment they feel a sore spot on the lip, tongue, or any part of the mucous membrane of the mouth, the per cent of lesions which are not cancer will rapidly increase, in my own experience, from less than three per cent up to 1900 to more than sixty per cent since 1920. Leucoplakia, areas of irritation due to ragged, dirty teeth, associated or not with the use of tobacco, and the lesions of the mouth due to Vincent's angina will predominate. It is surprising how much more common than was supposed is the geographical tongue; a submucous fibroma from an injury by a tooth, fishbone, toothpick or fork; tuberculosis, hypertrophied papillae of the base of the tongue; one or more white specks beneath the mucous membrane due to dilated mucous glands filled with secretion, not unlike the whiteheads or blackheads of the skin, are rapidly coming under observation in increasing numbers. Distinct lesions of syphilis like ulcer and gumma are relatively rare. In both benign and malignant lesions of the tongue a positive Wassermann is much more frequently reported from the laboratory than in similar benign and malignant lesions of the lip and other portions of the mucous membrane of the mouth.

Having educated the people, we must learn to recognize these various types of lesions of the mucous membrane which are not cancer, because in one type we can accomplish a cure by removing the cause, while in another type, or in a different stage of the same type, it is too late to expect a cure from the removal of the cause, and we must make a complete excision of the local area. This is best done with the cautery, except on the lip. For example, in leucoplakia, without crack, ulcer or wart, discontinue tobacco in all forms, and cleanse the teeth. If there is a crack, ulcer or wart, immediately excise the area with a good margin using the cautery, because it is impossible to tell whether cancer has already developed in the area of irritation. Do not expect much, if anything, for lesions of the mouth if the Wassermann is positive, from intravenous ther-

apy, unless it is a frank syphilitic ulcer which will rapidly react to arsphenamin.

The difficulty of diagnosis in these early lesions of the mouth is even greater than the technic of their proper complete excision when indicated. The simplest procedure is the excision of a "V" from the lower lip with the knife; the immediate closure of the wound with fine silk; then comes the microscopic study, and if there is the histological picture of cancer, the decision as to the removal of the glands. In fully developed cancer of the lower lip, even in early cases, it seems wiser to remove the glands.

When the lesion is on the tip or the side of the tongue, anterior to the base, the removal of a V-shaped piece giving the visible and palpable area a good margin is not much more difficult than the operation upon the lip. I always employ local anesthesia and the cautery, and close the defect with silver wire. It rarely heals, except by granulation. But when the area to be removed is on the base of the tongue, or on the floor of the mouth, between the base of the tongue and the last molars, the cheek should be split to give a better exposure. I now have two patients in which it is more than five years since the excision of an early cancer on the base of the tongue. These two cases are the best evidence of the effect of the educational effort.

When we must remove an area of the floor of the mouth, it is important to bear in mind the lingual artery. The operation here and at the base of the tongue is much more difficult than on the lip, and anterior tongue. In many cases one must remove the sublingual salivary gland as it is involved.

When the suspicious spot is on the gum the operation presents no difficulties. Use infiltration or regional anesthesia, and on the whole, it is wiser, after thorough cauterization, to extract teeth, if present, cauterize the tooth sockets and burn everything down to the bone. After this event a small piece of bone is discharged.

When the lesion is on the mucous membrane of the cheek, give it a wider margin than for any other area in the oral cavity.

I think I have proved the point that there is great opportunity for prevention in cancer of the mouth. Second, that there is much to be learned in the differential diagnosis and the selection of those cases which should be operated upon at once. The extent of the local excision is the same whether you think the lesion is benign or in the early stage of cancer. A little more removed does not add to mutilation, but does add to safety.

Biopsy is rarely indicated, except when the lesion is large and its removal mutilating. Unfortunately one rarely needs the microscope to diagnose the late stage of cancer of the mouth. But now and then a tuberculous ulceration may be extensive and suggest malignancy. It takes but a moment to decide the question with local anesthesia, the cautery and the frozen section. When the lesion is on the gum about good teeth, it is my habit to excise the area without extracting the teeth, and to extract the teeth only when the frozen section shows malignancy.

I have had a large opportunity to compare radiation with local excision in the early stage of cancer of the mouth, and my own experience forces me to the conclusion that excision with the cautery is the safer procedure. Radiation has its place in late cancer of the mouth. I know there is a great difference of opinion on the question of radiation for early cancer of the mouth.

The number of cases which are remaining free from recurrence after this local excision with the cautery in the early stages of cancer of the mouth, is increasing daily. There are practically no local recurrences. It is simply a question of when the glands should be removed. At the present time I am not removing the glands as a routine, except in cancer of the lower lip.

PREVENTION OF CANCER OF THE CERVIX

The evidence here is still obscure, but there are certain suggestive facts. Cancer of the cervix is more common in women who have borne children, and there is usually evidence of an injury, during the birth of a child, which has never healed. The repair, therefore, of all injuries of the cervix after childbirth might be a definite preventive measure.

In some cases cancer of the cervix gives no symptoms either in discharge or discomfort until the lesion has passed the stage of operability. At least, a certain per cent of patients claim that they were unaware of any sign of discharge or any discomfort until within a few days or weeks of the examination. It is quite possible that the per cent here may be no larger than in the mouth, or in the breast, less than three per cent.

When women in large numbers are told to seek examination the moment they notice anything unusual during the monthly periods or between periods, or after the change of life, the

medical profession will be confronted with a very large number of overlooked lacerations of the cervix, eversions with their irritation, polypoid growths in the cervical canal, and various types of hyperplasia of the mucous membrane of the cervix and the lumen of the uterus, which, when removed, prove microscopically benign. We do not know how many of these women are thus protected from cancer, perhaps more than we realize. Then, again, in this group, perhaps in one out of a hundred, more or less, the piece excised from the cervix or the curettings from the cervical canal or body, is microscopically cancer. These patients if properly treated at once do not die of cancer. Then, again, and in larger numbers, cancer of the cervix, easily recognized by sight and touch, and cancer of the body differentiated almost with certainty by the gross appearance of the curettings, that is the early stage of cancer of the cervix and the body, come under observation in such an early stage that they are still operable and many of them are curable. There is a difference of opinion as to the selection of radiation or hysterectomy in this early operable stage. But whatever type of treatment is chosen, the results are far better than in the late stage.

If women, therefore, come in larger numbers in this earlier stage of either the benign or the malignant lesion, we are increasing our diagnostic difficulties. First, there is the ordinary and well-established examination by touch and sight; second, the microscopic study of pieces excised from the cervix and curettings from the canal or lumen. In the past few years perhaps more than in the previous twenty years, tissues and sections have been sent to me from the cervix or lumen of the uterus in which two or more pathologists have disagreed as to the diagnosis of malignancy.

The majority of authorities feel there is no danger if there is an interval of time between the excision of a piece of the cervix or the curetting, and the treatment should the lesion prove to be malignant. I am rather inclined to urge frozen sections and, if there is any suspicion of malignancy, the immediate use of the cautery or the introduction of radium.

When women continue to menstruate profusely after forty-eight or fifty years of age, in spite of negative curettings, it is my opinion that it is a method of prevention to check the menstrual periods by radiation.

The difficulty of deciding these questions is that at the present time the number of women who have received the correct information and sought an immediate examination, is too small. It is as yet largely a question of a late examination of a distinctly benign lesion, on one hand, and a late and probably inoperable cancer, on the other. This explains why radiation is becoming the method of choice.

If the medical profession could exert the same energy and thought on the education of women before they become patients as they have done, and still do, on the diagnosis, operative treatment and radiation of late cancer of the cervix, they would cure more women of the disease and prevent a huge amount of unnecessary suffering among the mothers of the country.

EARLY DIAGNOSIS OF CANCER OF THE BREAST

Even in the breast, there is an opportunity for some preventive measures, but prevention here cannot be compared with that in cancer of the skin or mucous membrane of the mouth or the cervix of the uterus. The immediate removal of all lumps or tumors in women over twenty years of age will remove a certain number which are still benign, but which experience teaches us may ultimately become malignant. There is, first, the intra-canalicular myxo-adenoma which later develops into sarcoma, and the papillomatous cyst which has a tendency, after one or two years' growth, to change into cancer.

In the cases recorded in the Surgical Pathological Laboratory of the Johns Hopkins Hospital up to 1900 the per cent of cancer was fully eighty. Since 1920 it is less than fifty per cent.

As each community educates its women so will the surgeons and pathologists have to educate themselves to meet a new diagnostic difficulty. When the lump in the breast is still a lump only, it must be explored. At this exploration the majority of experienced surgeons can recognize the encapsulated adenoma, the blue-domed cyst with its clear or cloudy fluid, and the typical scirrhous or medullary cancer. But another group is growing larger, of papillomatous cysts and non-encapsulated areas that may be early cancer, or some form of chronic cystic mastitis, or chronic interstitial mastitis. For this group increasing in numbers one needs a frozen section. The diagnosis by means of a rapid frozen section first depends upon a good technician to make the section; second, upon an experienced and trained pathologist, whether he be the operator or not. Not until this frozen-

section diagnostic method is used daily in the operating room, will the operating room team be able to recognize these difficult breast tumors. This group of tumors is rarely seen in lumps of more than six months duration and is very common when the lump is of less than one month duration. Perhaps the laboratory in which I work is a good barometer of what is happening throughout the country. Since 1920 more of these border-line cases have been sent in for diagnosis, or because pathologists disagreed, than in the previous twenty years.

My studies show that the uneducated, ignorant and uninformed woman who feels a lump in the breast waits until, if the lump is cancer, it is in the late stage. During this time fifty per cent become hopeless, either because of chest wall infiltration, or metastasis. In the remaining fifty per cent the probability of a five-year cure is not more than ten per cent. So that the actual number of cures is less than ten per cent. If we take the early cases in which the lump is of less than one month's duration the probability of a hopeless condition falls from fifty to three per cent, and the probability of a five-year cure rises from fifteen to fifty per cent. If the glands are not involved, the probability of a cure is more than seventy.

When the lump is of one month duration or less, exploratory incision with frozen section diagnosis becomes the rule, while in late cases the necessity for it is the exception.

CANCER OF THE STOMACH, COLON AND RECTUM

When I reported the results in cancer of the stomach in 1913 the actual per cent of cures was less than two, as more than fifty per cent were inoperable. Of those in which resection was done ten per cent were living after five years. In the twelve years since this report there has been but very slight improvement. Operability has increased more rapidly than curability. In 1913 I found that the average duration of known "indigestive" symptoms was more than two years. There were two great errors. Either the patient did not see a doctor, or, if he did, he did not get a thorough examination.

As far as I can ascertain from my own facts and from the literature, the chances of overlooking a cancer of the right half of the stomach in the operable and curable stage, is very, very small. Repeated fluoroscopic examination and x-ray pictures, and careful chemical examination of gastric contents and stools, may fail to differentiate cancer from ulcer, but will rarely, if ever, miss an organic lesion. So that if patients report at once, there is every reason to believe that if a thorough examination is made, the per cent of operable cancer of the right half of the stomach will rapidly increase as well as the number of five-year cures after resection. The cardiac and esophageal end of the stomach, like tumor in the silent areas of the brain, often give no symptoms until the easily recognized cancer is inoperable, or, if in its early stage, is often overlooked even after a thorough examination.

In regard to the colon, my records show that previous to 1911 all cancers of the right colon came under observation in the inoperable stage, because the liquid contents of the right colon could pass through the neoplastic canal without blocking it, while the solid feces in the left colon blocked in the tumor canal and produced obstruction. Patients with obstruction had to come to surgery. Our first five-year cures were all cancers of the left colon, usually of the sigmoid, which came under observation because of obstruction, survived the colostomy which made later resection possible. Since then there has been a greater improvement among the cancers of the colon than among those of the stomach. We rarely see cases now with acute obstruction. They seek examination because of one or more attacks of colic, with or without vomiting, or with or without diarrhea or blood in the stools. If, fortunately, there is a palpable mass now found (as is common) in the right colon, operation is always indicated. But in these cases with a palpable mass, the bismuth studies from above and below always picture the contraction in the lumen of the colon. But when there is no palpable mass, in a few cases, the x-ray has not shown any change in the lumen of the gut. My studies teach me that the chances of overlooking a cancer of the colon in the x-ray are greater than in the stomach.

In cancer of the rectum and lower sigmoid there is no difficulty in diagnosis. What the finger fails to feel the proctoscope always sees. It is simply, therefore, a question of getting these patients in time and never failing in the examination of the rectum with the finger and the proctoscope. In patients who report at once after the slightest bleeding or discomfort in the lower bowel, we will meet a number of cases in which the examination is practically negative, and in which, when the patients are followed, nothing develops. The number of cases of mul-

tiple polypoids will increase. The things difficult to diagnose are the single polypoid growths, minute ulcers not unlike fissure and ulcer from hemorrhoids.

Resection of the colon when the tumor is situated in the sigmoid or above presents no difficulties. Resection and anastomosis of the colon is practically settled. When the cancer is low in the rectum excision from below on the lines of the old Kraske operation is not difficult, but when the cancer is high in the rectum or low in the sigmoid, the operative problem is a very difficult one and the mortality is high.

Although a great deal is written on cancer of the stomach, colon and rectum, it has largely to do with the technic of resection and suture on the one hand, or x-ray studies on the other. Clinics with large experience are so busy that they seem to have no time to make an exhaustive study, and smaller clinics hesitate to draw conclusions from small series of cases. My own experience with cancer of the stomach, colon and rectum is relatively small when compared with that of the breast, oral cavity and bone. But it is sufficient to show that so far the educational campaign has had little result as compared with the results in the breast and oral cavity. There is one thing the public can be certain of. There are many clinics throughout this country well equipped and capable of making a thorough examination, and many surgeons of training to make the operation safe. But in these clinics, in the great majority of cases of cancer, the condition is either inoperable when seen, or incurable, except in a small per cent of the cases when resected. In the stomach and upper colon the diagnostic instrument of precision is the x-ray, in the lower colon and the rectum the palpating finger and the proctoscope. In the breast the instrument of precision in diagnosis is the finger which feels the lump, the trained eye which looks at the fresh appearance or the frozen section, and the technician who makes and stains the section. In the skin and in the oral cavity one must have a knowledge of the various local lesions which will enable one to try the removal of the cause or causes first, or to resect the local lesion in such a technical way that no matter what the microscope reveals, there will be no further need of operation.

MODERN TENDENCIES IN THE TREATMENT OF CANCER*

By J. SHELTON HORSLEY, M.D.,
Richmond, Va.

Treatment of cancer necessarily must be guided by the end results, and the end results depend to a large extent upon the type of cancer. If one surgeon, for instance, in reporting operations for cancer of the breast includes as cancer a hyperplasia of the epithelial cells, which another surgeon calls benign, naturally the end results will vary so greatly as to be useless for comparison. So, too, statistics of operations for cancer of the stomach may be satisfactorily compared as to ultimate cures only when based upon similar pathologic conditions. The only accurate method of obtaining end results from operations for cancer is to know not only the surgical technic, but the histologic type and the extent of the malignancy. When these things are accurately compared we will have results that will be highly informative. It is undoubtedly true that a limited bungling operation on a mild cancer in an early stage will be more effective as to cure than a skillfully performed radical operation on a more malignant cancer or upon the same mild type when it is further advanced.

Though Coley's bacterial toxins seem to have cured a few cases of apparently hopeless sarcoma, the treatment by sera, chemicals and drugs based upon the hypothesis that the cause of all cancer is bacterial has no foundation in fact. Thus, Francis Carter Wood[1] says:

"The trained worker knows that if there is anything which the work of the last twenty years has demonstrated, it is that bacteria are not the exciting cause of cancer, that they are frequently present in the normal tissues, a fact known for at least thirty years, and that in most instances they are harmless saprophytes. Nevertheless, scarcely a month goes by that some alleged treatment of this type does not appear, and even the medical journals still contain occasional articles announcing the discovery of the bacterial cause of cancer and the inventor's belief that he is curing human cancer. This may be pardonable in those without training in methods of bacteriology and cancer research, but it is not pardonable in the trained laboratory worker.

"The same discouraging situation exists in regard to the various chemicals, drugs of all types, and so forth. There is no evidence that these affect the growth of a transplanted tumor. If, therefore, a transplanted tumor, which is a neoplasm in a foreign soil, is not influenced, it is much less likely that a

*Read in Section on Pathology, Symposium on Cancer, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

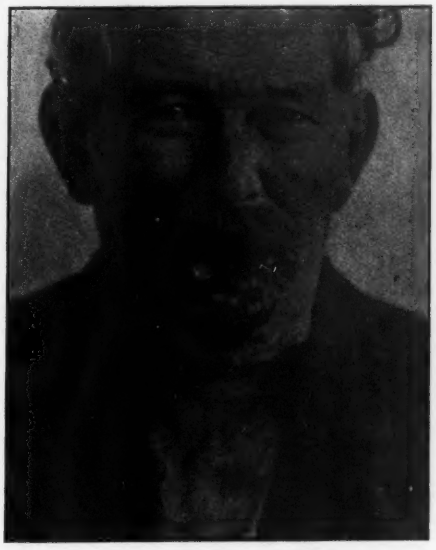

Fig. 1. Mr. A T., aged 62, just before operation. In the lower lip was an extensive squamous cell cancer, and there was a single rather large metastasis in the left submaxillary region. Biopsy showed the malignancy to be grade 1.

primary tumor, which is a perfectly adapted growth in its native soil, will be affected."

The much discussed researches of Gye[2] and of Barnard[3] while extremely interesting, chiefly amount to the identification of what was formerly considered an ultra-microscopic organism that passed through a fine filter and would reproduce sarcoma in chickens. The first experimental work in the reproduction of this sarcoma by a filterable virus was done by Peyton Rous at the Rockefeller Institute in 1911. Gye has apparently demonstrated that at least two factors are necessary for this agent to produce a sarcoma, the organism itself and some other substance that seems to activate the organism or to prepare tissues for its growth.

In recent years the prophylactic treatment of cancer has been greatly emphasized. Undoubtedly this will be beneficial in cancers occurring in regions of the body open to inspection. The removal of causes of irritation such as a sharp tooth or the excision of warts or moles, especially when deeply pigmented, serves to eliminate potential cancer. Bloodgood has very forcibly called attention to tobacco as causing cancer of the mouth and tongue, so that any suspicious spot in this region demands a discontinuance of the use of tobacco, else malignancy may occur. That a certain proportion of cancers of the stomach arise on a basis of apparently benign peptic ulcers seems generally conceded, though there is a considerable divergence of opinion as to the proportion of gastric cancers that so originate. Excision of gastric ulcers is, therefore, a prophylactic treatment for cancer of the stomach.

We must recognize that while cancer is originally local, and while early excision usually cures a large percentage of cancers, the malignancy in some cases is so high that by the time the disease is noticeable any form of eradication is almost hopeless. This group, fortunately, comprises probably less than ten per cent of all cancers, but it is always a subject for serious consideration.

The introduction by Halstead and by Willy Meyer of the principle of block dissection in operations for cancer of the breast was valuable not only in mammary cancer, but as establishing a principle in surgical operations for cancer in general. Crile's operation of block dissection of the neck for metastatic carcinoma in the cervical lymph nodes served still further to confirm the principle of block dissection for cancer. About the face or mouth the numerous and active lymphatic channels quickly convey the cancer cells from the primary lesion to the lymph nodes in the neck where the cells are detained, and here it is not so essential to include the original growth in a block dissection of the neck. The two lesions can be excised in different masses, but it is well to do the dissection, particularly at the adjacent portions of these masses, with the cautery.

The principle of dissection with the thermal or electric cautery, or at least of immediately cauterizing the raw surfaces made by knife dissection in cancer is exceedingly valuable. The thermo or electric cautery not only destroys the malignant cells that lie in its course, but to some extent seals the lymphatics and small blood vessels that may later absorb cancer cells unconsciously left. Bloodgood has made extensive use of the thermo-cautery, especially in certain tumors of the bone, as the myxomas, with marked tendencies to local or regional recurrence. The actual cautery, however, cannot be safely used in a close dissection of a large blood vessel. Another objection to an extensive cautery dissection is that it is sometimes followed by shock, but this may usually be successfully combatted by the continuous intravenous administration of five or ten per cent glucose solution followed by insulin, a most valuable remedy for shock.

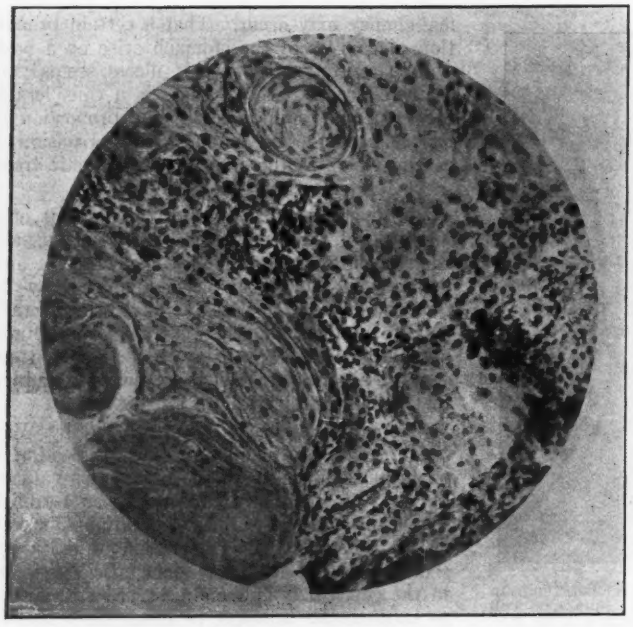

Fig. 2.—Photomicrograph of spinous cell type of squamous cancer removed from patient shown in Fig. 1. (x 140). Note the numerous "pearls" and the advanced differentiation of the squamous cells. It was because the malignancy was of this type that operation in what seemed to be an advanced and hopeless case was undertaken. If the biopsy had shown a more virulent type of malignancy, any surgical operation would have been futile.

A. C. Scott,[4] of Temple, Texas, has evolved a technic by which he does radical operations for metastatic cancer in the neck and for cancer of the breast using the electric cautery entirely. He reports excellent ultimate results.

The influence of irradiation by radium or roentgen-ray upon cancerous growths is difficult to evaluate. The unwarranted claims formerly heard have largely given place to the more accurate and conservative reports. The majority of radiologists have found that while there are many limitations of this therapy, the usefulness of irradiation is marked. No surgeon can accomplish the best work in the treatment of malignancy unless he combines in many instances along with the surgical technic the use of radium or the skillful application of roentgen-ray therapy by a competent radiologist. Fortunately, radiology seems most successful in the exceedingly cellular malignant tumors, as lymphosarcoma, in which surgical excision is futile. Here, too, let me emphasize the fact that roentgenology by an incompetent radiologist is even more dangerous than a sharp knife in the hands of an untrained surgeon.

Francis Carter Wood[5] says:

"There is no cogent evidence for, and much against, the conclusion that any process of immunization aids in the therapeutic efficacy of irradiation. Clinical cures can sometimes be obtained by irradiation in situations in which complete tumor cell destruction is impossible, but extensive connective tissue sclerosis can be produced, thus locking up any viable cells. The production of absolute permanence of cure by radiation therapy implies that the destruction of the tumor cells must be as complete as must be their removal for effective surgery."

This, of course, is strong evidence from a pathologist, who is unbiased as to the therapeutic choice in the treatment of cancer. It is undoubtedly true, however, that irradiation, either by roentgen-ray or by radium, with or without operation, is most helpful in many cases of cancer even if it does no more than to cause extensive connective tissue sclerosis which seals in the cancer cells.

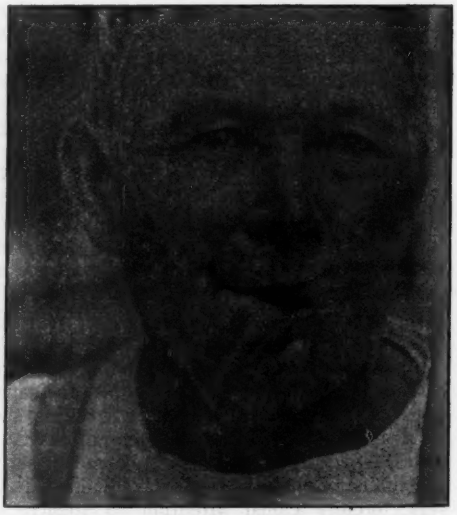

Fig. 3.—Photograph of the patient shown in Fig. 1 taken fifty days after operation. The patient was heard from November 4, 1925, two years after operation, and has had no recurrence.

Fig. 4.—Miss F. S., white, aged 90, had had a basal cell cancer of the nose for more than four years.

In cancer of the uterine cervix the application of radium seems to have found a satisfactory field, so much so that many surgeons have abandoned the extensive radical operation of Wertheim for this disease and rely either solely upon radium or upon an amputation of the cervix by the electric cautery followed by the insertion of radium.

That certain cancers of the large bowel, seemingly inoperable, may be rendered operable by the intelligent application of deep roentgen-ray therapy or by radium, has been impressed upon me by two cases of cancer of the rectum.

One of these patients, Mrs. F. M., in August, 1923, showed in the lower portion of the peritoneal cavity apparently extensive metastases that could be felt through the thin abdominal wall. Deep roentgen-ray therapy was given by Dr. Fred M. Hodges for several months. On Sept. 26, 1924, she entered St. Elizabeth's Hospital for colostomy because of obstruction due to the rectal lesion. On opening the abdomen no trace of metastasis could be seen. A radical operation for excision of the rectum was done. The patient made an immediate satisfactory recovery. In four months she had gained about forty pounds in weight. Unfortunately, however, metastasis occurred and the patient, while now living, is hopeless of recovery.

Another patient, Mr. C. F. E., was operated upon at about the same time. He had had an exploratory laparotomy July 2, 1924, at the Massachusetts General Hospital, and was pronounced to have an inoperable cancer of the rectum. A permanent left colostomy was done. Radium emanations, however, were implanted by the surgeon, and October 24, 1924, when the patient came under my care, the growth, while moderately extensive, seemed to be operable. An excision of the rectum was done. Examination of the specimen showed that in most of the ulcerated mass there was extensive scar tissue with only an occasional group of cancer cells. In one small portion, however, the cancer was cellular and apparently, active. The patient has made a satisfactory recovery, and at present, one year after operation, seems free from recurrence and in good health.

While in the first patient there was recurrence, she had several months of comfort after the operation. The second patient has at present no recurrence. Such results without a combination of the effects of irradiation and surgery would have been impossible. They seem to show that, while irradiation alone doubtless cannot cure cancer of the rectum or colon, it may retard the disease and render some cases operable that otherwise would be hopeless.

One of the most important aids in recent

Fig. 5.—Miss F. S., shown in the preceding figure, after operation and the transplantation of a flap from the forehead to secure the inhibitory effect of distant tissue.

Fig. 6.—Miss F. S., shown in Figs. 4 and 5, twelve days after the operation shown in Fig. 5. The pedicle flap from the forehead has been severed and a nostril has been made in the flap.

years in the intelligent treatment of cancer is the grading of the malignancy of cancer established by A. C. Broders, of the Mayo Clinic. This began originally in the spinous cell type of squamous cancer. As is well known, Broders uses the scale of four or fractions of four in indicating grades of malignancy of the spinous cell type of squamous cell cancer. Where there are many "pearls," showing advanced differentiation of the cells, the malignancy is recorded as grade 1. In such instances metastases are very infrequent and a limited local operation is usually all that is needful for cure. Extensive mutilating operations in these cases are unnecessary. At the other extreme, however, when the pathologic report shows that the cancer is grade 4, with no "pearls" and but little differentiation of the cancer cells, the most extensive operation should be done along with radiologic treatment, and even then cures of such cases seldom occur. As an illustration of the value of this method of Broders, the following case is interesting:

Mr. A. T., age 62, has had an ulcer on his lower lip for ten years. When he consulted me, November 3, 1923, the growth was extensive, occupying almost the entire lower lip with a single rather large metastasis in the left inferior maxillary region (Fig 1). A small piece of tissue removed with a cautery for microscopic examination showed a spinous cell type of squamous cancer with numerous "pearls," and marked differentiation of the cells (Fig. 2). It was grade 1 in malignancy. An excision of the primary lesion and the metastasis followed by a plastic operation for reconstruction of the lip was done (Fig 3). The patient was free from recurrence when last heard from, Nov. 4, 1925, two years after operation. If pathologic examination had not demonstrated a mild type of cancer in this case, operation would probably have done more harm than good.

By using this method of Broders, the punishment is made to fit the crime. In the more malignant types of cancer an incomplete operation in the early stages takes away whatever chance the patient may have had for cure. With a malignant, rapidly growing cancer, nothing short of the most radical operation should be done. If the dissection cannot be always made with the cautery, much of the raw surface, especially in the region of the lymphatics, should be cauterized. A drainage tube should be placed after any extensive operation for cancer wherever there is a cavity. The tube provides not only for draining the accumulated serum, but as a foreign body causes the lymphatics to pour out serum in an effort to expel the tube instead of absorbing it, with a possibility of imbibing the cancer cells that may have been left in microscopic amounts in the wound.

I have been particularly interested in the last few years in applying a principle of pathology to the treatment of intractable basal cell cancers. Local excision with a knife or cautery, irradiation by roentgen-ray or radium, or a paste frequently cures early basal cell cancer, but occasionally the lesion persists despite all such treatments. The devastation of an extensive basal cell cancer, or rodent ulcer as it was formerly termed, may be frightful. Death may occur from erosion of a vessel or from malnutrition and toxemia from the extensive spread of the disease. Excision of such a cancer with a knife is futile. It is apparently impossible to avoid implantation of some of the cancer cells into the raw surface left by the knife and recurrence readily takes place. Excision by a cau-

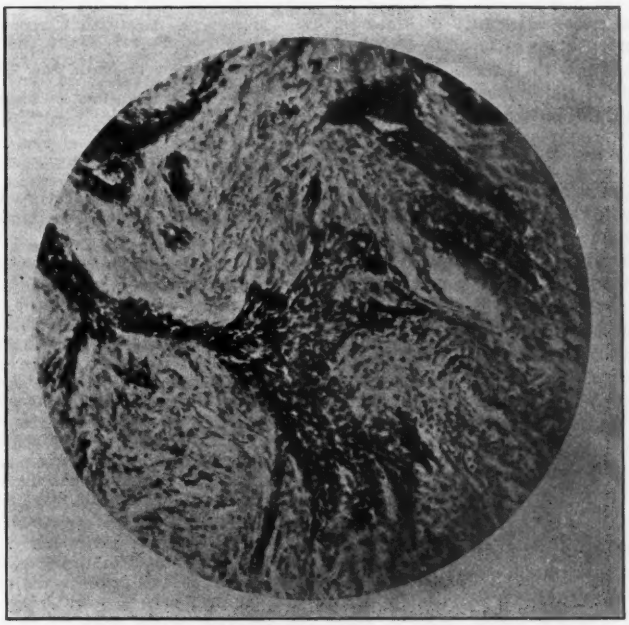

Fig. 7.—Photomicrograph of basal cell cancer removed from Miss F. S., the patient shown in Figures 4, 5 and 6. The cells show a spindle or filament form which is one of the common types of morphology in basal cell cancer. (x 150).

tery is more hopeful, but usually there is recurrence.

Basal cell cancer practically never metastasizes. Fennerud[6] reports two cases of his own, and on searching the literature he found only five other cases in which there was apparently metastasis of a basal cell cancer. Only one of these, reported by Beadles[7] seemed fully substantiated by microscopic examination of the primary lesion and of the neighboring lymph nodes. Such metastasis is so rare, as to be almost negligible, just as there are a few cases of cancer that heal spontaneously. Spinous cell cancer, especially of the more malignant type, metastasizes quite frequently, and as the usual site of the spinous cell type of squamous cancer is the face, these metastases are commonly found in the lymph nodes of the neck. As basal cell cancer and spinous cell cancer often occur in about the same anatomical regions, and as the cells of the basal cell cancer are no larger than those of the spinous cell cancer, there must be some other reason for this difference in metastasizing. Basal cell cancer spreads rather uniformly from the surface of the growth. It seems as I have mentioned elsewhere[8] that in the growth of the basal cell cancer there may be some product elaborated which breaks down the resistance of the adjacent tissue before the cancer can spread. In spinous cell cancer, however, such a provision is apparently unnecessary, and it can grow at distal points without any such change in the tissue.

If, then, normal tissue has an inhibiting influence upon basal cell cancer, the principle may be utilized of applying tissue from a distance over the raw surface left by excision of an intractable basal cell cancer. In a recent paper ten of these cases were reported. In all of them the cancer was extensive and intractable, and had resisted treatment. In several of them, operation, radium and roentgen-ray had all been tried without avail. In the first case in which the transplantation of a distant flap was used, May, 1920, the patient died apparently from angina pectoris four years after the main operation and appeared to be free from recurrence. In five of these cases there has been no recurrence. In five cases there was recurrence. When recurrence did take place, however, it was never in the flap or along the margin of the flap. In one instance, the recurrence was about ¼ inch from the flap and grew up to its margin, but has not yet invaded it.

I have recently had one other case, Miss F. S., 90 years of age, the lower portion of whose nose a basal cell cancer had almost destroyed (Fig. 4). Sept. 9, 1925, under local anesthesia the cancer was excised with the electric cautery and a flap was outlined from the forehead. Ten days later the flap was transplanted to the nose, and twelve days afterward the pedicle of the flap was severed, after having compressed it with soft-bladed forceps for short periods during the preceding seven days (Figs. 5, 6 and 7). It is too early, of course, to speak of cure in this case, but so far she is in good health and without sign of recurrence.

Whether eventually the resistance of the flap to the cancer will break down I do not know, but so far in all of these cases it seems to hold back the neoplasm. Just how deep and extensive is the influence of the transplantation of a distant flap it is difficult to say. At any rate,

there has been no recurrence closer than about a half centimeter to the flap, and it would seem that there is sufficient communication of the tissue fluids of the transplanted flap with those of the surface left after excision of the cancer to have at least some degree of inhibition to the growth of basal cell cancer for about a half centimeter from the flap.

The methods of application of this principle would depend, of course, upon the location of the basal cell cancer and upon other considerations. It would seem that tissues should be taken at least two centimeters from the margins of the excised cancer and preferably at a much greater distance. In some instances, however, it may be impracticable to secure the flap at a greater distance. The important point is that this operation should be considered not as a cosmetic operation, but as one of the steps in the cure of an intractable basal cell cancer. In the first operation of this kind the flap was taken from the chest. Flaps from the back or other regions may be utilized.

As a control, a case of spinous cell type of squamous cancer of the ear may be cited, in which after extensive excision of the cancer, a flap was transplanted from the back. There was a recurrence, and the cancer grew rapidly through the middle of the flap. This is in marked contrast to the behavior of a basal cell cancer in regard to a transplanted distant flap.

SUMMARY

The modern tendencies in the treatment of cancer depend essentially upon a closer relationship between the surgeon, the radiologist and the pathologist. The technic of the surgeon should be closely interwoven with a pathologic knowledge of the neoplasm. Each case should be regarded as a separate problem, and it should be considered whether the best results may be obtained by operation alone, by radiology alone, or by the combined use of these and other therapeutic measures. All of the therapeutic procedures should take into consideration: not only the origin and extent of the lesion, but the histologic structure of the cancer.

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DISCUSSION (Abstract)

Symposium on Cancer—Papers of Dr. Duval, Dr. Burrows, Dr. Lynch, Dr. Bloodgood and Dr. Horsley.

Dr. Jas. E. Thompson, Galveston, Tex.—There is no doubt in my mind that Dr. Burrows is on the right path and that the primary change in epithelial cells when they become cancerous is one of function, not merely of structure. If we can prove that metabolism is at fault, the solution of the problem draws a step nearer. In spite of the recent researches of Gye and Barnard, I cannot but believe that the infective agent is the cancer cell itself, as Butlin insisted many years ago. At all events, even if we admit that the cell contains an organism, (ultra-microscopic and non-filtrable) it is so intimately attached to the cancer cells that it cannot be carried to a distance unless the cell accompanies it.

I disagree fundamentally with Dr. Bloodgood about the respective value of laboratory research and publicity. Publicity brings cancer cases to the surgeon's notice in their early stages and so prolongs the sum total of human life. It does not, however, bring us one jot nearer the discovery of the origin of cancer. That will probably result from a happy combination of clinical observation, animal experimentation, and biochemical research.

Dr. Horsley believes that in cases of basal celled epithelioma, healthy flaps taken from a distance exert an inhibitory influence on the cancer cells that have escaped removal; and further that if cancer returns at the site of excision, a flap transplanted from a distance will resist invasion for a long period of time. The idea, I admit, is new to me. If true, it promises to be a valuable help to us in the surgery of cutaneous cancer.

Dr. E. H. Skinner, Kansas City, Mo.—Inasmuch as there has been no formal presentation of the role which x-ray and radium therapy plays in the modern attack upon malignancy, this discussion will summarize briefly, the known values, speculative values, known failures and palliative values of radiation therapy in the more common malignancies of daily practice.

The known values may be grouped practically under cancer of the skin, glands, mucous membranes and certain pelvic organs. The skin group contains keratoses, basal cell cancer, certain cancers of the skin side of the lip. The known gland grouping includes lymphosarcoma, Hodgkin's and the leukemias.

I am willing to allow the surgeons to argue among themselves as to whether cancer of the cervix uteri is within the known field of radiotherapy because the surgeons who use radium in their own clinics are the best supporters of this method. They offer arguments in favor of radium therapy which the radiologist cannot use without an accusation of bias.

Into the palliative group one easily places well-established cases of carcinoma of the uterus, esophagus, prostate, rectum, bladder and mouth.

The speculative field includes cancer of the bone, extensive breast malignancy and pedunculated growths of the stomach.

The known failures seem to include cancer of the lesser curvature of the stomach, liver, gall bladder, larynx, bone, lung and brain. Our experience has taught us to avoid even the approach of such cases, with certain exceptions.

There is over-lapping of the known and palliative groups. Radiologists have suffered from the too enthusiastic acceptance of impossible cases. Experience very promptly promotes a more sane and conservative appreciation of an inability to accomplish the impossible.

We believe that radiology has suffered a loss of confidence not only through this foolish acceptance of an impossible task but also because the ambition to cure malignancy has blinded the radiologists. Possibly if our ambition were a trifle less lofty and we had been content to arrest a malignancy, to promote a stationary tumor mass, to convert a growing tumor into a quiescent tumor, in other words, if we should try to make life easier and more comfortable and longer, we should be doing the possible task.

I should like to see a different philosophical attitude toward the cancer problem. It would seem that the surgical ambitions have expressed themselves as favoring the possibility of the cure of cancer through operative procedures. This method fails except in the very early or precancerous lesion that can be totally and completely excised beyond the limits of any stray cells or lymphatic complication.

This ambition to cure by excision has had a good chance and the technic of various difficult procedures has been developed to an extraordinary degree.

Let us purpose to undertake the management of malignancy rather than the impossible cure of malignancy. Do not misunderstand me. I refer expressly to the management of unmistakable malignancy with problematical surgical possibilities.

We have learned to manage heart disease, to control diabetes, to manage hypertension, to control certain types of nervous diseases, to manage syphilis. We no longer attempt the impossible cure of these diseases. We attempt to treat and teach the suffering individual to live as long and comfortably as possible.

Now, I maintain that if we will transfer malignancy to the category of diseases that are to be managed rather than cured, we will do better by our patients.

The solution of the cancer problem is surely going to follow the route of other scourges such as smallpox, yellow fever, malaria, cholera, diphtheria, etc. The solution lies in prevention and possible vaccination. Prevention is already a well defined and orderly method. Vaccination is the hope of the future. Vaccination is the basis of the new work of Gye and Barnard in England.

In the ultimate elimination or solution of the cancer problem as a whole, radiology probably plays a small part. In the treatment of established cancer, radiology occupies a rather considerable place.

Dr. Robert Wilson, Charleston, S. C.—Little has been said in the discussion that is very helpful to the internist. His problems are not concerned with the breast, the female pelvic organs or the lip, but rather with the internal organs, as the stomach, the gall bladder, the intestines and the lungs. It is seldom that we see a cancer of the stomach operated upon soon enough to save the patient's life, the reason of course being that the diagnosis is not made sufficiently early. If cancer of the stomach is to be treated successfully by surgery, as we treat cancer of the breast, the operation must be done when the diagnosis is still uncertain. It must be performed when the diagnosis is only a possibility, not when it is a certainty, and until the public can be made to realize this and is willing to submit to an operation under such circumstances, the mortality will continue high. This is a matter of education and as we have educated women to have lumps removed from the breasts before they are definitely malignant, so I believe we can educate people to submit to an early operation on the stomach in the presence of doubtful symptoms.

Dr. C. H. Mayo, Rochester, Minn.—It is generally accepted that radiant energy, x-ray and radium have made a definite place in the treatment of cancer, both in early cases for cure and in late cases for palliation. These agents are given preference in many late cases and also in a few early ones. More often they are employed as an adjunct to surgery and recurring cancer. They often induce regression of the cancer cell.

As Bloodgood has said, by educating the public concerning cancer more persons with cancer come early for treatment, thus greatly changing the proportion of cancers as compared with benign tumors, many of which might become cancers or develop cancer in adjacent tissues by chronic irritation.

The breast chronically discharging blood-tinged or coffee-colored fluid from ductile papilloma had best be treated by simple amputation to prevent the development of cancer later.

The new method of using the metallic salt, lead, in the treatment of cancer, and the various germs and chemical stimuli of cell growth show an increasing interest in investigation of the subject and are not to be discouraged or decried too soon. It will take several years of general use to prove their value over present methods even if great benefit is obtained. What is most needed is a proved test of the blood for internal cancer, like the Wassermann test for syphilis, which has revolutionized our diagnosis and knowledge of the results of treatment in this disease.

Dr. J. Shelton Horsley, Richmond, Va.—I wish to emphasize again that the portion of my paper referring to the treatment of intractable basal cell cancer by the transplantation of distant flaps is merely brought in as one of the features that might be considered a modern tendency in the treatment of a certain type of cancer. As emphasized in the paper and shown in the lantern slides, this method would be of therapeutic use only in cell cancer because it does not metastasize.

It has been too frequently assumed that embryonal tissue is synonymous with malignant tissue and that the development from an embryonal rest is supposed to account for cancer. The only difference between embryonal tissue and mature tissue is that embryonal tissue grows more rapidly. It still responds to the rules of growth and differentiation. Cancer, on the contrary, is anarchistic and does not conform to any particular laws of growth, and so is unlike embryonal tissue.

SURGERY

RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

CHLORID TREATMENT OF INTESTINAL OBSTRUCTION*†

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and
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Much interest has been manifested in recent years in the study of inorganic substances in their relation to metabolism, both normal and abnormal. Such work has served to present to the practical clinician the importance of a knowledge of inorganic salt metabolism in making his therapy rational. Now, as never before, clinicians are realizing the necessity of close observation and application of the work of their more scientific confreres, the pathologists, physiologists and chemists.

One phase of body chemistry which has recently attracted some attention is the chlorid content of the blood and urine in various diseases and conditions. Quantitative studies of the chlorids have chiefly been made by their estimation in terms of sodium chlorid. These studies have led to suggestions of rational therapy in some diseases which with further investigation may lead to standardized methods of treatment with chlorids.

The oldest studies made of chlorid retention were those in pneumonia. It was first noted that in this disease the chlorids in the urine were very scanty or almost absent. It was later found that there was a hypochloremia which disappeared after the crisis of the disease. No acceptable explanation has been given for these chlorid changes in the blood and urine. While no standardized chlorid therapy has been suggested for this disease, it has been stated by Haden[1] that in all cases of lobar pneumonia sufficient sodium chlorid should be given to keep the blood chlorids at or near the normal level.

Haden and Guffey[2] reported a case of pernicious vomiting of pregnancy in 1924. This patient showed but a trace of chlorids in the urine and a blood chlorid as low as 290 milligrams per 100 c.c. of the whole blood. There was also a definite alkalosis. A prompt recovery resulted after administration of sodium chlorid subcutaneously.

In a discussion of roentgen-ray sickness and chlorid retention, Cameron and McMillan[3] report definite lowering of chlorid excretion in the urine with no invariable change in the blood but sometimes a lowering. They noted that radiation of the epigastric region caused more marked effect upon the urine chlorid than exposure elsewhere in the body. They further noted the significant fact that the reactions following x-ray exposure were lessened or prevented by previous feeding of sodium chlorid. These authors speculated freely upon the possible similarity of the toxemia of roentgen-ray sickness to that of pyloric and intestinal obstruction and emphasized the possibility that sodium chlorid had a detoxicating function in the animal body.

In the early stages of war gas poisoning, there is a reduction in the blood and urine chlorids.[4] The significance of this has not been determined. The administration of physiologic saline solution is useful in the treatment of certain stages of this condition.

Underhill[5] and associates found a definite lowering of the blood chlorids in severe superficial burns. They state that "although the figures are in no sense complete, the data on sodium chlorid content of the blood plainly indicate that this salt played a significant role in fluid interchange at least during the initial state of the injury." Even without further scientific proof of its specific value it seems rational that sodium chlorid solution in physiologic strength should be given freely in all severe burns.

While studying gastric tetany, MacCallum, Lintz, Vermilye, Leggett and Boas[6] first noted a fall in the blood chlorids after ligating the pylorus in dogs. They found that the symptoms of tetany could be relieved by injections of sodium chlorid. Hastings, Murray and Murray[7] and Grant[8] have also noted a fall in chlorids following pyloric obstruction.

For the past three years we have been in-

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terested, both from the experimental and clinical standpoints, in the study of chlorid changes of the blood and urine in high intestinal and pyloric obstruction.[9,10] In an effort to attach some therapeutic importance to these changes we have studied carefully the relationship between the chlorids, the non-protein nitrogen elements and the changes in the alkali reserve of the blood.

Following pyloric and duodenal obstruction produced in dogs, monkeys[11] and rabbits, striking changes in the blood chemistry are constant. An early and often very rapid fall in the chlorids is observed. As the chlorids drop, there is an increase in the alkali reserve of the blood as shown by the rise in the carbon dioxid combining power. As the illness produced by the obstruction develops, there is an increase in the non-protein and urea nitrogen, both in the blood and urine. The chlorids diminish in the urine until at the height of the toxic process they are reduced to a mere trace.

Why the hypochloremia develops in acute pyloric and intestinal obstruction is not clear. It has been suggested that the chlorid is lost as hydrochloric acid in the vomitus. This assumption may have some foundation if the following explanation is accepted. The hydrochloric acid of the gastric juice is formed from the sodium chlorid of the blood, the sodium combining with the carbonic acid of the blood to form sodium bicarbonate. The excess of sodium bicarbonate passes into the intestine in the pancreatic and intestinal secretions and sodium chlorid is reformed in the intestine by the action of the hydrochloric acid contained in the gastric contents on the bicarbonate. As much sodium chlorid as is required by the organism is then reabsorbed. If the hydrochloric acid is vomited, or its passage into the intestine prevented by pyloric obstruction, the circle is broken, and the body fluids are left poor in chlorids, but rich in bicarbonate. We have suggested that the chlorids may in some manner be used as a neutralizing or detoxicating agent by uniting with the toxic body produced rendering it less toxic or non-toxic, at the same time that the released sodium unites with the carbonic acid increasing the sodium bicarbonate.

Gamble and McIver[12] consider that the loss of body fluid is inadequately described by the term dehydration. The impairment of function is not only due to the loss of water, but also due to the accompanying loss of the electrolytes sodium and chlorin. They state that the essential requirement in the treatment of dehydration is the replacement of these ionic factors of body fluid structure. Hartwell and Houget[13] in 1912, reported experimental work on duodenal obstruction in the dog and concluded, since they were able to prolong the life of their animals with physiologic salt solution, that death was postponed by preventing dehydration. The value of the sodium chlorid was not considered.

The increase in the non-protein and urea nitrogen in the blood and urine indicates an abnormal destruction of protein tissue. Presumably this is caused by a toxic process. The rise in the above nitrogenous elements in the blood takes place after a certain depletion of the blood chlorids which suggests the possibility that the latter may be exhausted to a certain degree before the toxic products develop, thus acting as a protection against toxemia.

The importance of the use of sodium chlorid as an adjunct to the treatment of intestinal or pyloric obstruction can now hardly be fairly questioned.[14] Such importance has been demonstrated experimentally by the marked prolongation of life of animals with these obstructions receiving daily doses of this salt. In our experiments we have found that untreated dogs die in two to eight days with obstruction of the duodenum or upper jejunum, but may be kept alive from 21 to 30 days with sodium chlorid. Distilled water given in the same quantity as sodium chlorid solution does not prolong life. The benefit is then directly due to the solution of chlorid. We have also noted this therapeutic benefit in several clinical cases.[15] Dixon[16] and McVicar[17] in recent reports have confirmed and emphasized the clinical value of such treatment in pyloric and upper intestinal obstruction.

It is interesting to note that the nitrogenous changes produced in experimental animals can be returned to normal limits by the proper administration of sodium chlorid. Likewise, the alkalosis that develops in acute pyloric and duodenal obstruction is reduced to normal by sodium chlorid. The quantity of sodium chlorid to be given in any particular patient depends upon the need of that patient as shown by the blood chlorids. It is quite agreed by all that it is not always possible to have the laboratory data indicated. The urine can be qualitatively tested very quickly by adding silver nitrate solution to the patient's urine and comparing the precipitate with that in normal urine. If a low chlorid is detected, the need is evident. In the very acute high obstructions there is much greater likelihood of giving too

little chlorid than too much. We have roughly estimated that it is wise to give about one gram of sodium chlorid per kilo of body weight as an initial dose over a period of a few hours. This may be conveniently given in one or two per cent solution by hypodermoclysis and in 5 per cent solution in the vein. Proctoclysis of physiologic saline is also used, but is much too slow and unreliable to be depended upon entirely.

It has seemed to us quite important to emphasize the value of the administration of sodium chlorid prior to operation in all cases of acute intestinal obstruction. The minimum delay in operation required for this treatment will more than be compensated for by the restoration, at least in part, of substances necessary for proper bodily function.

It is fully recognized that in the treatment of intestinal obstruction the relief of the mechanical obstruction, dehydration and starvation must receive proper attention with perhaps enterostomy as an additional factor of value.

CONCLUSIONS

The value of sodium chlorid in the adjunct treatment of intestinal obstruction has been proven beyond doubt. Whatever the explanation of the chemical changes in the blood and urine may prove to be, the fact remains, that there is a definite therapeutic benefit derived from the administration of sodium chlorid in pyloric and intestinal obstructions which tends to reduce the blood chemistry to normal and prolong life. It is this point that we wish to emphasize.

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DISCUSSION (Abstract)

Dr. Russell L. Haden, Kansas City, Mo.—We feel there is no question concerning the valuable therapeutic effect of sodium chlorid in the toxemia of high intestinal obstruction.

There is too much of a tendency on the part of clinicians to consider intestinal obstruction as a local disease. The toxemia is due to a functional rather than a mechanical interruption of continuity. There is much doubt whether there is any unusual toxic body in the lumen of the gut above the obstruction. The intoxication is a general one. The chemical changes characteristic of the condition affect every cell of the body.

Just now there is some discussion concerning the mode of action of the sodium chlorid. We have ascribed to it a detoxicating function. Gamble thinks it has only a restorative function. He suggests that the fall in blood chlorids is due entirely to vomiting. It is granted by all, however, that the sodium chlorid is of great value. The exact mode of action may be well left for future determination.

HYPERTONIC SODIUM CHLORID SOLUTION INTRAVENOUSLY IN THE TREATMENT OF EXTENSIVE SUPERFICIAL BURNS*†

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It is a notable fact that superficial burns seem to produce a more marked general reaction than those of greater depth. The cause of the symptom complex seen in extensive burns has not been established.

Numerous theories have been advanced, but no single one is sufficient to explain all of the phenomena encountered, and the majority are based on insufficient evidence. Two of the principal theories do not seem inconsistent and when combined will explain the greater portion of the changes found. They are: (1) the absorption of a toxic substance from the burned area; and (2) physical and chemical changes in the circulating blood.

THE TOXIN THEORY

There is considerable clinical evidence to show that at least some of the symptoms observed

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in burn cases are due to the absorption and circulation of a toxic substance in the blood. The prompt relief of systemic symptoms following debridement as described by Willis,[1] Ravdin,[2] and others, seems to indicate that a harmful substance is being absorbed from the injured tissue. Davidson[3] has apparently demonstrated that the severity of symptoms in cases seriously burned is decreased when they are treated locally with tannic acid. The tannic acid presumably precipitates the protein decomposition products and thus prevents their absorption into the blood stream. Robertson and Boyd[4] obtained good results in treating such cases in children by exsanguination transfusion, which would seem to show that some deleterious material had been removed from the circulation.

Autopsy findings indicate that the cause of death in most instances is a severe toxemia. Bardeen[5] in a careful postmortem study of five fatal burn cases, found a very marked involvement of the entire lymphatic structure with changes characteristic of severe toxic conditions. He concluded that death was due to an acute toxemia. Weiskotten[6] found pathological conditions in the suprarenals, heart muscle, lymphatic structures and kidneys similar to those seen in diphtheria. Albrycht[7] reported marked changes in the suprarenals, and noted that they resembled those observed after peptone poisoning or anaphylactic shock. Broncati[8] also found evidence of anaphylactic shock and believed it to be due to absorption of protein cleavage products from the burned area.

Certain experimental evidence also points to the presence of a toxin in the circulating blood. Vaccarezza[9] observed that when parabiosis was established between two animals and one was burned, they both showed toxic symptoms. Markusfeld and Steinhous[10] demonstrated that if the blood supply was cut off and the nerves left intact, the burning of the part produced little constitutional disturbance. However, if the nerves were divided and the blood supply not interfered with, the same degree of injury produced severe symptoms. Robertson and Boyd[11] were able to isolate primary and secondary proteoses from experimental animals when burned. The greatest concentration of these substances was obtained at the end of thirty-six hours.

Therefore the clinical reports, autopsy findings and certain experimental work all seem to indicate the presence of some circulating toxin. If there be such a substance in the blood in burn cases, it seems probable that it is the result of the action of heat on the skin; a protein decomposition product. The intravenous injection of certain protein derivatives produces a marked concentration of the blood (Cannon[12]) similar to that found in cases with severe burns.

PHYSICAL AND CHEMICAL CHANGES IN THE BLOOD

As early as 1862, Baraduc[13] noted the "thickening of the blood" in these cases and attributed this to the flow of serum into the blisters. He believed that this caused a slowing of the blood stream with resulting thrombosis. Locke[14] found an apparent relation between the severity of the burn and the number of red blood cells. In each of five severe cases, the erythrocyte count was as high as 9,000,000. All died. In four less serious ones, all of whom recovered, the highest count was 7,260,000. He found very little morphological change in the red cells. There was also a marked increase in the number of leucocytes and blood platelets, and again the increase was roughly proportionate to the severity of the lesion.

In a study of twenty-one clinical cases, Underhill[15] found the concentration changes in the blood to correspond to the severity of the lesion. In those clinically grouped as serious, the hemoglobin content of the blood was always over 125 per cent of the normal; in those considered not serious, it was under 125 per cent in each instance. In one severe case, the hemoglobin was 209 per cent. The blood chlorids were consistently diminished, but more markedly so in those with extensive lesions. There was, therefore, a fairly definite relationship between the blood chlorids, concentration, blood pressure, and prognosis.

That blood concentration is a factor of great importance seems evident. In a study of the blood in influenza and phosgene gas poisoning, Underhill[16] and his associates found that the severity of symptoms corresponded closely to its concentration. He says, "marked concentration of the blood means a failing circulation, an inefficient oxygen carrier, oxygen starvation of the tissues, fall of temperature, and finally suspension of vital activities." Cannon[17] believes low blood pressure to be the sustaining factor in shock. It is the result of diminished blood volume due to blood concentration. A systolic blood pressure of below 80 mm. of mercury, when sustained, causes serious tissue damage, especially to the central nervous system. It seems probable that the marked decrease in blood chlorids, as observed in burns, is a factor in the production of blood concentration, with

Date	Hemoglobin	Leucocytes	Blood Chlorids	Blood Urea	Blood N. P. M.	Blood Creatinin	CO_2 Combining Power	Urine Chlorids 24-hr. Output	Urine Urea 24-hr. Output	Urine Creatinin 24-hr. Output
First Day	144% (Salhi) Case II	44000 Case I	100 mgs. per 100 c.c. Case II							
Second Day										
Third Day			100 mgs. per 100 c.c. Case I							
Fourth Day			230 mgs. per 100 c.c. Case I	34 mgs. per 100 c.c. Case I	32 mgs. per 100 c.c. Case I	2.5 mgs. per 100 c.c. Case I	53.6 Vol. % Case I			
Fifth Day								1.6 gms. Case I	.19 gms. Case I	.836 gms. Case I
Sixth Day								.6 gms. Case I		

cent of the osmotic tension in the blood stream its sequelae, for they are responsible for 60 per (Howell[18]). With a relatively sudden decrease in the chlorid content, we would expect a reduction of the osmotic tension with a resulting loss of serum.

From this review of the literature, it seems entirely possible that both factors under discussion are involved in the production of the syndrome seen in extensive superficial burns. The possibility also suggests itself that the concentration of the blood is secondary to the absorption of a toxic protein derivative from the burned tissue.

HYPERTONIC SOLUTIONS

A hypertonic solution of glucose was first used for intravenous injections, in a clinical case, by Haden[19] in 1919. Since that time, hypertonic solutions of glucose and of sodium chlorid have been used as therapeutic agents in a number of conditions, as increased intracranial tension (Weed and McKibbon[20]), and (Foley[21]), intestinal obstruction (Haden and Orr[22]), and shock (Woodyatt.[23]) Its use in these dissimilar conditions was based chiefly on the assumption that it would increase the osmotic tension in the blood stream, with a resulting withdrawal of fluid from the tissues and body cavities. In addition to this function, chlorids seem to have a certain specific action in intestinal obstruction (Haden and Orr[24], and Dixon[25]). Barach[26] demonstrated that the intravenous injection of 100 c.c. of 15 per cent sodium chlorid solution would increase the blood volume as much as 500 to 1200 c.c. The maximum result was obtained in thirty minutes, and there was some increase for three and a half to four hours. In one case in which there was a diminished volume before injection, the increase lasted three days. He did not find any evidence of blood destruction and there were no severe reactions.

At the University of Virginia Hospital within the past eighteen months, we have given twenty-four injections of hypertonic sodium chlorid solution to sixteen patients. Such conditions as increased intracranial tension, intestinal obstruction, pulmonary edema, etc., were treated. The results have been striking in some cases, and satisfactory in the majority. The most pronounced results were obtained in three cases of intestinal obstruction and one of pulmonary edema. There were no severe reactions.

Hypertonic solution seems to have a definite therapeutic value, and its use is apparently not attended by any considerable danger.

In view of the evidence given above of diminished blood volume in superficial burns, it occurred to us that the intravenous injection of hypertonic sodium chlorid solution might be a useful therapeutic measure in their treatment. A case in which it was used with gratifying results is here reported.

REPORT OF CASE

Case 1.—Miss B. W., white, aged 17 years, was admitted to the University of Virginia Hospital on January 30, 1925, at 10 a. m. Two hours before this her clothing caught on fire and she sustained very extensive superficial burns. On admission she was found to have been burned over practically the entire back, the buttocks, the greater portion of both thighs, the posterior surface of the left arm, the palm of the left hand, and the left breast. Using Berkow's method, it was estimated that approximately 36 per cent of the body surface was involved; 6 per cent of which was of the first degree, 11 per cent of the second

degree, and 19 per cent of the third degree. The temperature was 100°, pulse rate 100 and respiration 24 per minute. The leucocytes were 44,000. Sterile flannel dressings were applied and orders given to keep the patient warm, and force fluids.

A few hours later she began vomiting and this continued at frequent intervals throughout the next twenty-four hours. The following morning, her condition was poor, with a temperature of 96.4° and pulse of such poor quality that the rate could not be determined. This condition persisted throughout the day, even though she was given approximately 3000 c.c. of 5 per cent glucose by intravenous infusion and hypodermoclysis. During this period, she was also given 20 minims of adrenalin intravenously, and 10 grains of caffein, with 1/6 grain morphin by hypodermic injection.

At six p. m., approximately thirty-six hours after the injury, her condition seemed critical. She was vomiting at very frequent intervals. The temperature was subnormal, and the pulse barely perceptible at the wrist. Since she appeared to be growing progressively worse, we decided to give her an intravenous infusion of hypertonic salt solution. Accordingly, 100 c.c. of 20 per cent sodium chlorid solution was injected. Following this there was a short chill and rise of temperature to 101°. There was a prompt and striking improvement in the pulse, and in her general condition. The vomiting practically ceased, and was not again a marked symptom during the acute period. A debridement was done at the end of twelve days, and Thiersch grafts applied, but it was impossible to obtain sufficient skin to cover the entire area.

The granulations began to suppurate profusely, and cultures showed the hemolytic streptococcus. Bacterial counts were made and the left thigh exposed to action of rays from a quartz lamp; the right thigh was used as a control. The number of bacteria found in smears from the left thigh very rapidly, while those from the right showed very little change. This method was thereafter used to keep down infection in these areas.

Case 2.—A white child, five years of age, was brought to the University Hospital on September 17, 1925. About two hours previous to admission, it was almost totally burned by an explosion of kerosene oil, and was moribund when first seen. Examination showed the burns to be chiefly of the third degree. Sufficient blood for hemoglobin and chlorid estimations was obtained with difficulty. The child expired before any treatment could be rendered. This case is mentioned only because of the low chlorid and high hemoglobin content of the blood.

The laboratory findings in these cases are of some interest.

SUMMARY AND CONCLUSIONS

The salient symptoms observed in superficial burns can be explained by a combination of the two theories presented. Experimental and clinical evidence, and autopsy findings, indicate the presence of a toxin in the circulation in these cases. That there is a concentration of the blood in a certain number of severe burns seems definitely established, and it is probable that the majority of cases with extensive lesions will show such a change.

It would seem, with the amount of injured tissue present, that protein decomposition products would be absorbed, and Robertson and Boyd were able to demonstrate primary and secondary proteoses in burned animals. When certain protein derivatives are injected intravenously, increased blood concentration is produced. It, therefore, seems possible that the increased concentration found in severe burns is the result of the absorption of some such substances.

Cannon considers low blood pressure the sustaining factor in shock, and believes that this is the result of a diminished blood volume. It therefore seems logical that a prompt increase in the volume of the blood is important.

Hypertonic sodium chlorid solution intravenously increases the blood volume promptly, and for a considerable period of time. For the above reasons, we believe its use in the treatment of severe burn cases is rational. It is not proposed as a substitute for debridement or the systematic forcing of fluids. It is suggested, however that it be used to restore the blood volume and thus, in certain instances, prepare the patient for debridement.

We will not attempt to draw conclusions from one case, but we were distinctly impressed with the prompt and continued improvement in this instance, following the intravenous injection of 100 c.c. of 20 per cent salt solution.

We believe that this review of the literature and the result obtained in our case warrants investigation, both along clinical and experimental lines. It is with this in mind that we make this report.

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DISCUSSION (Abstract)

Dr. Russell L. Haden, Kansas City, Mo.—In clinical medicine we encounter a group of conditions characterized by the presence in the blood stream of a toxin of protein origin. Lobar pneumonia and high intestinal obstruction are classic examples of such a toxemia. After severe burns, also, symptoms are observed which are seemingly due to a circulating toxic body or bodies.

Such toxemias not only exhibit similar clinical characteristics, but also have in common certain changes in the blood and urine chemistry. Usually there is a rise in the non-protein nitrogen, and fall in the chlorids of the blood. An acidosis seldom occurs. Often an alkalosis is found. There is always an increase in destruction of body protein.

In burns the cause for the protein destruction is apparent. In other toxemias the relation of the protein destruction is not so clear. It is not yet finally settled whether the heaping up of non-protein nitrogen in the blood is due entirely to increased destruction of protein or is incident to impaired kidney function.

The method of production of the blood changes is important from the standpoint of treatment. In burns there are three ways in which the toxin may be controlled. Certain protein precipitants, such as tannic acid, as suggested by Davidson, decrease the store of protein products from which absorption is taking place. Once the toxins are in the blood stream the attempt is made to hasten excretion. The final possibility is the neutralization of the toxin in the body fluids.

There is every reason for using sodium chlorid solution in the treatment of burns. Fluids are vitally necessary to diminish the increased blood concentration which also usually occurs. Fluids should not be added as water alone, but as water and inorganic salts. Likewise, the salt solution improves kidney function and betters excretion. It seems most probable also that the sodium chlorid acts as a detoxicating factor and in a sense neutralizes the toxin. This action can be proven in a striking manner in the toxemia of high intestinal obstruction.

Dr. J. Shelton Horsley, Richmond, Va.—Dr. Bigger is to be congratulated on the logical clinical application of the very excellent experimental work done by Haden and Orr in intestinal obstruction. The toxic product of intestinal obstruction seems to resemble in some respects the toxic product developed by superficial burns, and being followed by low chlorids in the blood, naturally the treatment would be the same as Haden and Orr have shown is effective in high intestinal obstruction with lowered chlorids.

Apparently sodium chlorid seems more efficacious than other chlorids.

From the brilliant result obtained by Dr. Bigger in his first case, it seems that this method of using hypertonic sodium chlorid solution in extensive burns is a valuable therapeutic aid in these cases. Of course, it must not be considered a specific, but only as a new therapeutic agent of great value. The apparent affinity of toxic products resulting from superficial burns for the intestine, particularly the duodenum and upper small intestine, as shown by necropsies of patients dying from burns, is very suggestive that there may be some close relation between this material and the toxic products that are formed as a result of high intestinal obstruction. This, of course, brings an entirely new viewpoint in the treatment of superficial burns, and one that is extremely interesting.

URETERAL CALCULI*

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DIFFERING OPINIONS

Our chief object in presenting this subject is to discuss the several different opinions held by the general practitioner, the surgeon and the urologist on the management of ureteral stones.

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The general practitioner is inclined to keep the patient quiet, give hot applications, morphin and hope the pain of the acute attack will soon subside. When it does, his interest is likely to cease until a future date when the same kind of call receives the same kind of treatment. The stone, however, in the meantime has grown larger and the attacks of renal colic have become perhaps more characteristic.

The general surgeon is inclined to err in relying too much upon the x-ray findings, especially when negative. He pays too little attention to the significance of red blood cells in the urine and may be easily discouraged in the non-operative measures employed to cause the stone to pass. When he operates, if it be for a stone, he is often content to allow the patient to go indefinitely without dilatation of the ureter unless another stone forms.

The modern urologist feels rather confident that 95 per cent or more of ureteral calculi will not require an operation. He believes the development of the calculus is due to a local, not a general, cause, and that the best way to effect the passage of the stone is to dilate the ureter, and that the best way to prevent the formation of other calculi is to keep the ureter dilated so as to eliminate inflammation of the renal pelvis, prevent stagnation of urine by back pressure and to have provided in advance an ample passageway for a stone to pass through in case one should form.

SYMPTOMS AND DIAGNOSIS

In dealing with stones as small as those usually found in the ureter, a negative x-ray plate means little or nothing. Every now and then we see a patient whose physician tells us that a stone was suspected but that the x-ray was negative, and no further effort was made to determine if a stone or stricture of the ureter was present.

There are few diseases with symptoms more characteristic than those we call "kidney colic." Such symptoms in a patient with microscopic blood in the urine, nearly always mean there is a stone or stricture in the ureter, even though the x-ray is negative.

The difficult ones to recognize are those in which we do not find a typical history. Instead, there are perhaps evidences of appendicitis, gall bladder disturbances and other diseases which produce abdominal pain. It is in these more or less complicated cases in which the findings are atypical that complete examinations are necessary to clear the diagnosis. It should be remembered that calcareous glands and phleboliths are both much more frequently present than are ureteral calculi.

The main purpose of the x-ray picture, where the symptoms and urinary findings are atypical, is not so much to determine the presence of uteral calculus, but rather to find its size and whether or not there are other and larger calculi in the kidney.

Renal colic, red blood cells and pus cells in the urine should always be regarded as findings of importance which require a search to determine the source and cause of the pain, blood and pus cells. Still another sign of a stone in the ureter which reflects considerable discredit upon our profession is the frequency with which we find a medium size incision over McBurney's point.

SELECTION OF METHOD

In the past many manipulative measures have been employed to cause stones to pass. At present we are inclined to regard dilation of the ureter as the most important measure we can employ. We cannot cause a change in the size of the stone, but we can make the channel larger through which it has to pass.

Not infrequently we see a patient who has been confined to bed for a period of weeks on account of renal colic and for fear the attacks may grow worse if he gets up. Such treatment tends to bring about just the thing we most fear: that is, the stone may remain in one place long enough to produce a dilated point at which it may make a "permanent home," allowing the urine to pass without further attacks of pain. In such an event, the stone gradually increases in size until cystoscopic manipulation is useless and a major operation becomes necessary for a condition which at an earlier date could have been relieved by a minor cystoscopic manipulation.

As long as a small stone in the ureter keeps up kidney colic, the condition may be regarded as favorable and there is a good chance of causing the stone to pass. For this reason, as soon as the pain subsides, we allow the patient to get up and around hoping other attacks may occur, until dilatation of the ureter and the recurrent attacks cause the stone to pass.

We succeed in obtaining more than 95 per cent of ureteral calculi without operative measures. Many stones, of course, would and do pass without any effort on the part of the surgeon. The trouble is we never can tell in advance the character of the stone, whether smooth

or rough, round or irregular; nor do we know the size of the narrowest point in the ureter, and so we may lose valuable time in leaving to nature a job bigger than she can do.

If a stone is now allowed to remain too long in one place, surprisingly large calculi may be caused to pass down the ureter by extensive dilatation with tapering, large or multiple, ureteral catheters and bougies, without undue damage to the kidney.

The general surgeon, as a rule, does not make a sufficiently organized and determined effort to obtain stones by cystoscopic measures and is likely to grow restless, as may the patient. Both may allow themselves to be persuaded that an operation is required. This is a major, though not necessarily a serious one, and it is an operation that perhaps will leave the ureter narrowed at this point and, therefore, more likely to develop stones in the future. In fact, the operation cannot always be considered successful, even when the stone is obtained and the patient recovers and for a while seems normal.

We do not understand very well why stones form, but it is generally admitted by those who have given the most thought and study to the subject that ureteral strictures or obstructions and the coincident infections play an important part. Bearing this in mind, it becomes obvious that by dilating the ureter to allow the stone to pass, we employ our best prophylactic measures against further stone formation, while on the other hand, the operative treatment not only does not take care of a possible stricture which may have been an underlying causative factor, but tends to make a further deposit of scar tissue at that point where the ureter is incised.

Therefore, we know that both the immediate and the remote well being of the patient is conserved by the cystoscopic method rather than by operation. Nor is the total amount of pain necessarily lessened by the operation, for if the post-operative pain does not equal or exceed that caused by the cystoscopic manipulation, the subsequent care of the ureteral stricture will more than make up for the seeming temporary advantage of the operation.

THE MANAGEMENT OF PATIENTS WITH URETERAL CALCULI

Briefly stated, as we see it, the management of ureteral calculi should be about as follows: in the midst of an attack of kidney colic, the patient should be placed in bed; ¼ grain of morphin with 1/150 grain of atrophin should be given hypodermatically; hot applications, such as electric pads, or a turkish bath towel wrung out of hot water, should be placed on the painful side and hot water bottles should be used to maintain the heat. The morphin may be repeated once, if necessary, without danger, but if more seems required it should be given with caution. The patient is urged to drink freely of water and is given sodium citrate, one drachm three times a day, to render the urine alkalin and to act as a mild diuretic. Purgatives and enemas are given as needed.

The pain often subsides within a few hours or within a day or so, and while the patient may be more comfortable, there is probably sufficient uneasiness to keep him in fear of another attack. This seems to be the ideal time to dilate the ureter in order to provide early a larger passageway for the stone to descend. A catheter as large as possible should be passed as high as feasible and allowed to remain in the ureter for a considerable time (½ to 24 hours). The length of time the catheter is left in the ureter depends upon the relative size of the stone, the ureter and the catheter; that is, if the stone is small and a good size of garceau catheter is passed, it may be removed within ten or fifteen minutes, while if only a small catheter is passed, and with difficulty, it should be left in place as long as feasible.

As previously stated, nothing facilitates the passage of a stone like a thorough dilatation of the ureter. At times it is impossible to pass a catheter by a stone. A whalebone filliform, or a small catheter, may be coaxed by. If it passes, it should be allowed to remain in the ureter 24 to 48 hours. Within a few days a larger catheter may pass or two or three small ones. Such catheters or filliforms permit the passage of urine by the stone while the ureter is being dilated.

The above statements apply to stones of small or medium size. Those of larger size, if complicated with pyelonephritis or attended by unusually stormy reactions following cystoscopic manipulations, may require immediate operation, ureterolithotomy.

Between the extremes of the small stones which are removed easily and the large, irregular ones associated with pyelonephritis, which definitely require operative measures, are a large number of border line cases which often tax our urologic judgment. The stones may be small enough to pass but fail to come out after apparently adequate manipulative measures. In such cases, we persist with large catheters, or several small ones, leave them in place for some time and inject mercurochrome, or other germicidal

agents into the pelvis of the kidneys. By drainage and pelvic lavage the danger of pyelonephritis is reduced. The blunt bougies recently placed upon the market often can be made to pass a calculus when the tapering catheters will not pass. The excellent operative cystoscope designed by McCarthy and known as the "for-oblique" enables us to introduce catheters and bougies of much larger size than has been possible heretofore in the male. It is somewhat more difficult at first to catheterize the ureters with this type of cystoscope, but the larger catheters which may be introduced through it more than make up for this slight disadvantage.

The most difficult cases encountered are those in which no catheter or bougie can be passed up the ureter beyond the calculus. Then patience, skill and judgment are required and no set rules for their management can be made. Occasionally a stone may be seen projecting from the ureter into the bladder. In such an instance the lower end of the ureter may be slit with cystoscopic scissors or with the high frequency electrode. If in spite of reasonable cystoscopic manipulation we are unable to remove the calculus, ureterolithotomy should be performed. This is not a dangerous nor a very difficult operation, especially if a ureteral catheter has been passed into the ureter to assist in identifying it and to fix the stone where it has been recently located by the x-ray negatives. Subsequently two important things should be remembered: Keep the ureter dilated and control the infection, both of which would probably play an important part in the formation of other stones.

SUMMARY

(1) The chief object of this paper is to discuss the different opinions held by the general practitioner, who is inclined to apply palliative measures for "kidney colic" without an adequate search later for its cause; the surgeon, who relies too much on negative x-ray plates and pays too little attention to the significance of microscopic blood cells in the urine; and the urologist, who is likely to neglect dilatation of the ureter as a preventive measure, both after removal of calculi by cystoscopic measures or by operation.

(2) Ureteral stones rarely require an operation or even many cystoscopic manipulations if the ureter is well dilated promptly after the initial attack of kidney colic.

(3) We cannot change the size of the ureteral calculus but we can readily increase the size of the passageway through which it has to descend.

(4) Not infrequently valuable time is lost in vain effort to let a small or medium size stone pass without assistance when the ureter is abnormally small and should have been well dilated at a much earlier period.

(5) Operations are required for stones obviously too large to descend the ureter and for calculi which may not be large but are complicated by pyelonephritis, urethral obstructions, a tendency to sepsis, anuria, etc.

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DISCUSSION (Abstract)

Dr. Bransford Lewis, St. Louis, Mo.—There is no doubt that many ureteral stone cases are subjected to open operation, with its attendant risks (even mortality) and longer periods of convalescence that might well be relieved by cystoscopic methods. The selection of an open operation does not always depend upon the surgeon's lack of confidence in the capability of the cystoscopic method. A urological friend of mine relates that when requested by a general surgeon to cystoscope and catheterize a certain case suspected as the possessor of a ureteral stone in transit, he was pointedly cautioned not to remove the stone in case he found one. It was to be preserved for open operation.

For removal by cystoscopic methods there are two plans of attack conceivable: one to reduce the size of the stone so it may pass through or be pulled through the ureteral channel; the other, to widen the caliber of the channel enough for the stone to pass through. The latter is the more practical and by far the safer. If one grasps a stone in the ureter with a forceps without having sufficient caliber to get out, he may find himself in the predicament of the man who caught the bear. The difficulty is in letting go, rather than in holding on. There is not enough room for both forceps and stone to be pulled out together. Such an endeavor must always be preceded by ample dilatation of the whole length of ureter below the stone. This is the more logical, as well as safer method, anyhow. Get sufficient dilatation of the ureter and the stone passes down, either popping into the bladder or placing itself at the disposal of ureteral forceps at the outlet..

Dr. Hamilton W. McKay, Charlotte, N. C.—There can be no doubt that the modern urologist relies too much on instruments of precision to arrive at a diagnosis, and by so doing loses sight of the clinical picture presented by the patient. The essayist has wisely emphasized the symptoms of renal colic, and I agree with him that given a patient with "kidney colic" plus red blood cells in the urine, we do not need the cystoscope or x-ray to make a diagnosis of ureteral pathology.

By cystoscopic manipulation with a ureteral instrument of choice, not only the dilatation of the ureter, but changing the axis of the stone facilitates its passage. The time to increase ureteral dilatation is before ureteral spasm develops following the first dilatation. For example, if you dilate with a No. 5 F. ureteral catheter, leaving it in for two days or longer, when this catheter is removed, introduce a larger one at once before the

ureter becomes spasmodic. This plan has been of great value to me.

Urologists should have some very definite "follow up" system in these cases to have them report regularly for examination after removal of ureteral stone to see if the urine is free of infection, and if the ureter should be further dilated.

Dr. Howard L. Cecil, Dallas, Tex.—I have designed and made an instrument to remove ureteral calculi by pulling them out or crushing them in the ureter.

It consists of a telescope handle, a flexible cable and two jaws opened and closed by means of a steel wire which is looped over a steel plug in the terminal jaw.

The first patient that this instrument was used on was one on whom I had done a total cystectomy for a very large and rapidly growing tumor. The ureters were implanted about an inch above the anterior superior spine. He had a calculus about four inches from the surface that could not be removed by dilatation, injection of oil, etc. This instrument was passed beyond the stone and the jaws separated. The instrument was then withdrawn until the proximal jaw was felt to pass the stone. The jaws were then closed, and by determining the distance between them by the scale on the handle, it was evident that the stone had been engaged. Traction was then made, but the stone did not move. The jaws were then closed by the screw on the handle and the stone crushed. It was passed on the following day. There was no ill effect from the manipulation.

You will note that the instrument is quite strong. I have crushed some twenty-five stones that I removed by cystoscopic manipulation. In addition to this test, a force of one hundred pounds has been exerted by actual weight. The instrument would probably have stood much more, but I think you will agree that this is quite sufficient to crush any stone and far greater than any that could be prudently used to pull them out.

Dr. Frank S. Schoonover, Fort Worth, Tex.—I would stress a point which has not been mentioned in the discussion, namely, the importance of clearing up the residual infection and the kidneys, both after the removal of stone by manipulation and by surgical approach. It is undoubtedly true that the recurrence of stone in the kidney is largely due to infection, and so long as this infection persists the patient will remain uncured.

POLYCYSTIC KIDNEY*†

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My attention was especially directed toward that decidedly unusual condition known as polycystic kidney, when I encountered the four cases herewith reported, two of which came under my personal supervision.

Case 1.—A married woman, the mother of several children, white, aged about 36, was admitted to the hospital complaining of a "mass" upon the right side. No thorough urologic examination was carried out, but an exploratory incision made over the tumor revealed a polycystic kidney. All cysts visible through the incision were punctured, but even this intervention proved too much for the patient, who died about two hours after removal from the operating room.

Case 2.—A white married woman, aged 44, was admitted to the hospital February 2, 1925. The complaint was of pain in the right lower abdominal quadrant, which had been gradually increasing in intensity for the preceding two years; a mass in the right side; rapid loss of weight, and some show of blood in both feces and urine.

The patient was extremely weak, and showed some elevation of temperature, the white blood count was 44,000; with polymorphonuclears 97 per cent. Owing to the extremely poor condition operation was at once undertaken and a number of renal cysts were drained through a right lumbar incision. Death took place two days later, and autopsy showed both kidneys to be mere masses of cysts, the diagnosis of polycystic kidneys being made on the post-mortem findings.

Case 3.—A white male, aged 36, was admitted to our service January 17, 1923. He complained of headache and urinary disturbance from which he had been suffering for the preceding six years. The temperature was 99°, but the blood findings threw no light upon the cause of the condition. The urinalysis showed a large amount of albumen and a few hyaline and granular casts. Examination of the upper urinary tract revealed large masses in both renal regions, though the ureteral catheter passed to the pelvis on either side without obstruction. Functional tests showed the output of both sides very much below normal, and the results of blood chemistry gave a high percentage of urea. Upon these findings and the roentgenographic appearance, we made a diagnosis of bilateral cystic kidney, and advised a double decapsulation with puncture of all visible cysts. The patient, however, refused operation and left the hospital March 22, 1923. We understand that he has recently died, some 12 months after our examination.

Case 4.—A white male, aged 30, was admitted August 13, 1922, complaining of nausea, pain in the stomach, weakness and vertigo. Beside the usual diseases of childhood, he had had small-pox, "rheumatism" and malaria. In 1921 he had been infected with both gonorrhea and syphilis. Five weeks previously fever had developed, since which time the patient had been practically confined to his bed. He was a slender, poorly nourished man, with pale mucous membranes, carious teeth, and general glandular enlargement. The left kidney was found to be very much enlarged and for this reason he was transferred to our urologic service. The blood pressure was found to be 104/86; the temperature ranged from 101 to 102°, the pulse was rapid and respiration increased. The blood count showed red cells 5,400,000; white cells 21,700; polymorphonuclears 76 per cent.

The urologic examination showed a pale bladder mucosa with several small cysts scattered over the base. Bilateral ureteral catheterization revealed a bilateral hydronephrosis, larger on the left side. The left kidney was so much enlarged that it extended below the pelvic brim, and the right kidney was also found to be enlarged although the patient had made no complaint of

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symptoms on that side. The diagnosis was polycystic kidney, and on account of the greater enlargement of the left organ and the fact that the patient was suffering great pain on that side, we advised exploration of the left kidney.

On January 29, 1923 the left kidney was exposed through a curved lumbar incision. As the kidney was so much enlarged that it was impossible to deliver it through the wound, the capsule was incised and all the surface cysts punctured. These cysts varied in size all the way from one to three inches in diameter. When they had been emptied, the size of the kidney was sufficiently reduced to permit its delivery, so that all the remaining visible cysts were opened in the same manner, after which the kidney was replaced and the wound closed in the usual manner. There was a severe reaction following this intervention, but the patient rallied and improved rapidly, so that he was able to leave the hospital on February 27.

On the eighteenth of the following August the patient returned complaining of severe pain in the right lower quadrant, radiating to the bladder. There was also an acute epididymitis. The blood count at this time was white cells 30,650 and polymorphonuclears 88 per cent. Albumen, pus and a few granular casts were found in the urine. The functional test, however, was excellent, and the blood chemistry showed urea within normal limits.

On October 19, 1924, we made an incision over the unoperated (right) kidney, and exposed two large cysts lying at the two poles. These cysts were as large as an averaged sized apple. The puncture of these two cysts so reduced the size of the kidney that we were able to incise the kidney capsule and strip it back, after which the remaining cysts thus rendered visible were emptied in the same way. The organ was then replaced and the wound closed with two large drainage tubes. There was no hindrance to recovery though there was free drainage from the wound for at least thirty days. The patient was discharged on January 10, 1925, and when last seen was in very fair condition, so that it seems probable that he may continue to live for several years.

SYMPTOMS

It will be noticed from these cases that the symptoms of this disease are slight but quite constant. Pain in the region of one or both kidneys, headache, nausea, dizziness, loss of weight and strength, and frequency of urination comprise the total number of symptoms enumerated by these patients. The presence of the abnormal tumor in one or both sides was known by each of them. The pain in two cases was unilateral and was not noticeable in the third. In the usual case the pain is first felt in the lumbar region and later may be referred to the abdomen. In one of our cases it was referred downward into the scrotum. It is usually of a sickening character and is most marked when the patient is up and around. It may be persistent or intermittent, with severe attacks resembling renal colic. Nausea, vomiting, headache and dizziness, with furred tongue and other disorders of digestion, are common symptoms in advanced cases. Albumen and casts and sometimes blood may be found in the urine, with or without bladder disturbance. In one of our cases frequency was a symptom, but the other two had no such trouble. The tumor masses are usually quite large, bilateral, and more or less tender on pressure. Sometimes they feel nodular to the examiner, as in one of our cases. More often they do not, but simply reach down to the pelvic brim and inward almost to the midline. Pressure on them causes a sickening sort of pain. Occasionally only one side can be felt; and many cases are never found until autopsy. Hematuria may recur at intervals for years; and this, with signs of chronic intestinal nephritis, such as pallor, cardiac hypertrophy, albumin and casts in the urine, may be the only symptoms.

ETIOLOGY

The majority of authors regard polycystic kidney as a congenital condition arising as a result of embryological defects. Ribbert has advanced a theory that the cysts are due to a failure of union of the glomerular part of the tubule with the distal rudiment which grows up from the ureter. Bard thinks it is due to weakened tubular walls which dilate from normal intracystic pressure. Shattuck and Kuster consider that the cysts arise from retained remains of the Wolffian body. On the other hand, Virchow, Goodhart, Beckman, Roberts, *et al*, account for the cysts on the basis of a cirrhosis causing constriction of the tubules or partial closure of the papillae due to an increase of interstitial fibrous tissue. Other theories advanced are that the cysts are due to local destruction of tissue with centres of softening and degeneration. Lastly, some writers regard the cystic mass as a true neoplasm. According to Morris, the correct view probably is that the cysts are in every case due to retention, which may be caused by a variety of pathological changes, as congenital malformations, intra-uterine papillary nephritis, acquired interstitial nephritis, impacted calculus, or injury. In infants one occasionally sees a cystic dilation of the tubules occupying the pyramids, which in turn causes a fusiform widening of the conducting tubules.

PATHOLOGY

The whole kidney in this lesion becomes transformed into cysts of varying sizes. These cysts occupy all parts of the organ and cause it to become much larger and heavier than normal. One case is recorded where the kidney weighed as much as sixteen pounds. The cysts bulge

the capsule outward and press the kidney substance inward, and are lined by a layer of low epithelium. The contents are different colored fluids containing albumin, urea, fat, phosphatic crystals, uric acid, epithelial cells, and sometimes cholesterin and leucin. The cysts do not communicate with the renal pelvis, but do occasionally with each other. Lying between the cysts may be found portions of renal tissue, but for the most part this has given way to fibrous tissue with degenerated arteries and infiltrations of leukocytes, thus evidencing inflammation due to pressure. Remnants of glomeruli are noticeable in some of the smaller cysts.

Both kidneys are usually affected, though one may be much smaller than the other. Out of sixty-two cases Lejars found one that was unilateral; and even in this case there was one small cyst in the sound kidney. Post-mortem examination of eighty-eight cases by Ritchie showed all but two to be polycystic in both kidneys. Of this series twenty-one had cystic disease of the liver. Infection may set up in the cysts, resulting in the various types of nephritis, pyonephritis, or even perinephritic abscess. Dilation of the kidney pelvis may occur from kinking of the ureters due to the dragging downward of the heavy tumor mass; and sometimes other abnormalities may be found associated with the polycystic condition.

DIAGNOSIS

Polycystic kidney is to be diagnosed from (1) hydronephrosis, (2) tuberculosis, (3) malignancy, (4) other types of cysts, as hydatid. In the first condition the smooth outline, fluctuant feel, the x-ray picture showing dilated pelvis, ought to be sufficient to clear up the diagnosis. Tuberculosis can be ruled out by the temperature, pulse, family history, the accompanying pulmonary signs, and by cystoscopic examination showing usually some bladder pathology of the same type. Malignant tumors are practically never bilateral, are usually fixed, are accompanied by more pain and pressure symptoms, and are almost always the cause of a rapid loss of weight and strength. Also the average age of malignant growths is somewhat older than that of polycystic kidney, though in a series of cases collected by Morris the average age of the patients was found around forty years. Hydatid cysts could be diagnosed only by finding the hooklets in the urine or in fluid aspirated from the cysts. As stated before in this paper, the diagnosis of this condition is frequently not made until autopsy. Lejars found that out of sixty-two cases the correct diagnosis had been made in only five; and of all recorded cases studied by Morris, nine per cent showed no kidney symptoms and were not suspected until autopsy.

PROGNOSIS

Out of twenty-eight cases followed up by Ritchie, fifteen died between the first and tenth year after symptoms had developed. One lived twenty-two years, while one died in three weeks. The last stages of the disease are simply those of any advanced nephritis, with vomiting, convulsions, urinary suppression, etc. Before the terminal breakdown the patients may live for years in comparative comfort.

TREATMENT

Since our conception of this disease is one in which the pathology is due to retention of urinary products in the kidney, the logical thing to do is to relieve pressure wherever possible. This was first advocated by Rovsing in 1912, who claimed that it prolonged the lives of the patients. In most cases this cannot be done because the pathology is so far advanced that surgical operation will increase rather than decrease the strain on already weakened kidney tissue.

A thorough cystoscopic examination with catheterization of both kidneys and determination of the functional efficiency ought to be done. When both kidneys are large and painful, and the urinary output is scant, there is some authority supporting the operation of decapsulation and rupturing of all surface cysts in order to relieve pressure on the subjacent kidney tissue. In one of our cases this was done, with apparent benefit, since the patient is still doing well. In septic cases drainage should be done, as in Case 2 of our series, though in this case the patient died in spite of the operation. The presence of ureteral calculi, strictures, trigonal hypertrophy or other obstructive pathology are all indications for appropriate treatment, in order to remove whatever hindrance there may be to a free urinary output. After these surgical matters are attended to, the patient should be placed on a carefully regulated program of living to avoid any undue stress or strain on the kidneys, such as might be caused by overeating, drinking, loss of sleep, hard labor, exposure, or infection. He should be encouraged to drink much water all the time, and should be instructed to subsist on a diet low in proteins. By this sort of regime his life will be prolonged as far as is compatible with disabled vital organs.

SUMMARY

(1) Polycystic kidney is always bilateral, occurs most frequently before the age of 40 and ordinarily gives no symptoms beyond those common to any chronic nephritis.

(2) The cysts are probably due in every case to retention, which may be caused by a variety of pathological changes.

(3) The whole kidney becomes transformed into a large number of cysts which communicate with each other but not with the kidney pelvis. They are lined by a layer of low epithelium and produce pressure destruction of the intervening kidney tissue.

(4) The majority of these cases die within the first five years after development of symptoms. The terminal symptoms are those of advanced nephritis.

(5) The only treatment of value is to regulate the patient's habits and diet and to remove any obstruction to the free outflow of urine that can be reached surgically.

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DISCUSSION (Abstract)

Dr. A. Nelken, New Orleans, La.—I wish to mention in connection with this excellent paper a case of polycystic kidneys that came under my care about two years ago in which the history elicited was that the father and one brother had died of the same condition. This woman's child, now about 10 years old, has the same condition and it has advanced to a point where there is evidence of considerable diminution in kidney function.

Dr. R. S. Mallard, Ft. Worth, Tex.—I would like to emphasize a point made by the late Dr. Geraghty concerning polycystic kidneys. He said that "no polycystic kidney should be removed if it shows a trace of 'phthalein, because it is surprising how long some of these patients live which show only a trace." He told me of a patient of his who lived four years with such a small output.

EYE, EAR, NOSE AND THROAT

RETINO-CHOROIDITIS JUXTA-PAPILLARIS: REPORT OF TWO CASES WITH A SUGGESTION AS TO ETIOLOGY AND TREATMENT*

By W. G. HARRISON, M.D.,
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In 1908, Edmund Jensen[1] described a new form of chorioretinitis and mentioned the distinguishing features as: (1) occurs in early life; (2) without symptoms other than hazy vision; (3) the ophthalmoscopic examination shows a single focus of infiltration near the disc edge; and (4) there is a sector defect of the visual field from papilla to periphery.

Jensen regarded it as primarily a disease of the retinal blood vessels later involving the retinal nerve fibers and choroid, because after disappearance of the infiltration one could recognize no atrophy or discoloration of the papilla. He explained the defect of the visual field as produced by vascular obliteration, within the confines of the infiltration, and believed that perception was destroyed in that portion of the retina supplied by these vessels. Jensen regarded colds as an important factor in the causation of the disease. He reported four cases, in none of which was the fovea involved, in this respect differing from the later experience of several other observers.

Groes-Peterson[2] reported thirteen new cases, and maintained that nerve fiber defect was primarily responsible for the scotoma, because (1) the vessels traversing the area of infiltration often do not lead to the part of the retina involved in the defect; (2) ischemia has not been observed; (3) discoloration of the papilla may be so slight as to escape notice; (4) the visual defect corresponds closely to the anatomic course of the nerve fibers rather than to blood vessel distribution.

Blesig,[3] Ronne,[4] Hamm,[5] and Appleman,[6] agree that the pathology is primarily in the retinal nerve fiber layer. Ormond[7] reported a typical case in 1912, accepting the pathological explanation of Jensen that the retinal blood vessels, rather than the nerve fibers, were primarily involved. In 1914, van der Hoeve[8] reviewed the 25 reported cases and demonstrated that we can explain the various visual circular and central sector defects observed by modifying the accepted scheme of retinal fiber distribution. He reported an interesting case with central vision defect followed through several relapses, and believed that the essential pathological lesion was in the nerve fiber layer, the choroid not necessarily being involved. This writer recognizes three types of nerve fiber defects: the sectorial, the arched, and the central, in this respect differing very much from the field findings reported in the cases of Jensen.

Ronne[9] [10] describes two cases, which with a careful evaluation of preceding reports, led him to agree with van der Hoeve, that the macula is sometimes affected and that the essential lesion is in the choroid, though probably different from this disease as one sees it associated with tuberculosis or the disseminated variety produced by lues.

In 1910, Verhoeff[11] reported a pathological study of a case of syphilis of the eye involving especially the papilla, in which he demonstrated the spirochetes of Schaudinn and in 1916 he presented to the American Ophthalmological Society the first pathological study of an eye showing a lesion exactly like that described by Jensen, in that it was solitary, and affected most severely the nerve fiber layer, and the eye had many opacities of the vitreous. In describing this case, Verhoeff says:

> "It differs from Jensen's cases in the far greater intensity of the process, and in the occurrence of infiltration changes in the anterior part of the eye and in the existence of positive evidence of syphilis. It is evident, however, that if the case had been of a milder type and the retinal lesion had ultimately healed, the condition probably could not have been distinguished from Jensen's retinitis."

This writer suggests that Jensen's disease is possibly just an ordinary chorioretinitis with a single focus in the retina near the disc margin and believes some are due to syphilis and some to other causes.

As additional evidence that syphilis is sometimes a potent etiologic factor, Zeeman[13] reports a case where

> "the retinal picture and disturbance in the field of vision corresponds closely with the symptom-complex described by Edmund Jensen." Says he: "There was a central scotoma and a 45-degree sector scotoma of the periphery, the latter pointing definitely to nerve fiber injury. Anti-luetic treatment cured the case."

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

Gilbert[14] reported a case that seems definitely due to syphilis (Tr. Amer. Ophth. Soc., 1916, xvi).

In 1917, Martin[15] reviewed the literature and reported a very interesting case to this Section at the Memphis meeting and he seems to have been the first to suggest focal infection as a probable cause.

Puiggari[16] published an illustrated description of three clear-cut cases in all of which tuberculosis and lues could be excluded and in all these cases the patients recovered. While not definitely stated, it is intimated that vision and eye grounds returned to normal.

At the Washington meeting of the American Academy of Ophthalmology and Otolaryngology, 1923, Martin[17] reported his second case, which was seen during the first week of the disease. At this time, the media were clear, but there was a definite retinitis soon followed by haziness and, in fact, all the signs of a severe choroiditis. The condition cleared entirely and the essayist seemed to regard treatment as a rather negative factor.

In the discussion of Martin's paper de Schweinitz[18] referred to three cases he had seen: one in a girl of eight, another of twelve, and a man in his early thirties. The young girl had rapidly improved after the cure of focal infection in the mouth; the second after the relief of a chlorotic anemia.

Depene[19] has described a severe case in which tuberculosis and lues could both be excluded. Vision returned almost to normal though treatment seemed to have had little influence.

In Fischer's[20] case, the patient had no treatment other than atropin. The impaired central vision early returned to normal though the sector scotoma remained. He excluded tuberculosis and syphilis.

After a careful study of four of his own cases and a review of those previously reported, Fleischer[21] disagrees with Groes-Petersen, van der Hoeve and the conclusions implied by the pathological report of Verhoeff, that the disease is primarily a retinitis. He contends that the disease is primarily in the choroidal vessels, and the nerve fiber layer becomes affected after the extension from the choroid through the outer layers of the retina. In one of his cases, the author discovered an associated, disseminated sclerosis and mentions this as a possible influence.

Igersheimer[22] details a careful study of animal experiments where syphilitic material was injected directly into the blood vessels and he believes the disease thus produced begins primarily in the choroid and extends through the posterior layers of the retina to the nerve fibers. He saw a number of cases corresponding to Jensen's chorioretinitis juxta-papillaris, and while he does not definitely state that lues is the cause (p. 318) he gives the history of a case in a woman 31, known to have had lues 14 years previously, and he evidently regards this case as syphilitic in origin.

Kohne[23] believes influenza, syphilis and tuberculosis are important etiological factors. He quotes Schertlin as believing this disease a solitary tubercle of the choroid because a few cases have responded to the tuberculin test and he says Leber places one case in this same category.

Ronne[24] believes the disease is often wrongly diagnosed as tubercle of the choroid and disseminated choroiditis because the nerve fiber bundle defect is not discovered (the fields are not plotted). Because spontaneous recovery is frequent, he thinks these cases are considered cured by the tuberculin therapy instituted without sufficient indications.

In view of the early work of Irons, Davis, Rosenow, de Schweinitz and others on focal infection as a cause of eye disease, together with an increasingly large number of inflammatory conditions of the fundus recently reported (Luedde and Hardesty,[25] Zentmayer,[26] Harhison,[27] Langdon[28]) as relieved by removal of foci in teeth, sinuses, tonsils and elsewhere, we may well believe that a choroiditis or retinitis with single or multiple lesions may be thus caused, whether the lesion be near the papilla, in the periphery or involving the fovea.

Each of the cases reported presents a unique feature:

Case 1.—A white male, age 30, in perfect health, while observing a demonstration of a mine rescue apparatus, had his attention called to the fact that oxygen escaping from a tube would make a glowing coal on the end of a tape burst into a brilliant flame. Someone suggested sticking a lighted cigar to the escaping oxygen, and found it burned with extreme brightness. Another observer placed a lighted cigarette to the escaping oxygen and immediately there was an explosive brilliant flame equal to the calcium light used in nocturnal photography.

Several observers complained that for a few minutes they could not see well, and the patient who was nearer the flame than any of the others, was unable to see from either eye for a few minutes, and the vision from the right eye remained very hazy and blurred. Seventy-two hours later he consulted me for the first time.

The left eye was normal. The right eye was normal to all external examination. The vision of the right eye was 20/200; the media were clear; the papilla was much swollen all the way round, requiring a 0+3. glass to make some of its outlines clear. There were no signs of hemorrhage. A bank of cotton-white infiltration, or edema extended from the nerve head toward the periphery just above the fovea, the lower border overlying the latter. It was regarded as a case of neuroretinitis, and thorough studies of the urine, blood, sinuses and nervous system proved negative.

A consultant agreed that it was a case of neuroretinitis from the effects of the bright light and the man was kept in bed, given daily purgatives, sweat baths, potassium iodid with recurring blisters to his right temple. A further examination was entirely negative except for the presence of two abscessed teeth and diseased tonsils. After ten days he was urged to have these removed.

The vision improved slowly, but definitely, and three weeks later he was referred for consultation to Dr. de Schweinitz from whose notes I now quote:

"On arrival his vision was 5/30, and four days later it was 5/9. Vision of the left eye was entirely normal. It is my impression that the pathological conditions of the right eye represent the so-called Jensen's choroiditis, or, to use his own expression, retinochoroiditis juxta-papillaris, which, as you know, is a plastic choroiditis, taking its origin near the disc, which is speedily covered by a yellowish-white exudation, often fringed with hemorrhages and sometimes swollen rather far forward into the vitreous, the characteristic field phenomenon being a wedge-shaped scotoma which joins the blind spot and extends to the periphery. Such a scotoma, as you know, is not satisfactorily mapped except with the aid of a Bjerrum screen, or at least, a campimeter surface.

"All of these conditions are present in Mr. T.'s right eye, in addition to which there are a few vitreous opacities. The condition closely resembles an optic neuritis, or choked disc, except that the swelling is in exudation.

"As you know, a definite cause for this condition has not been found, although in one pathological investigation made in this country it seemed unquestionably to be due to syphilis, but this has not been true in the majority of cases, and is evidently not true in the case of your patient. One of the most pronounced cases that I have ever seen occurred in a young woman, and was apparently in association with a persistent chlorotic anemia, and disappeared with the subsidence of the anemia. I know of no reason why focal infections should not be an etiological factor. I do not believe that the accident which the patient experienced is the cause of this condition, although it may be that the exposure to the oxygen flame may have been an exciting cause. I am most strongly of the opinion that the apical abscesses in his teeth should be eliminated, as well as the tonsillar infection, which is, as you point out, quite evident, and I believe that the sooner this is done the better for the patient, and assume that I am quite in accord with your own thought in this matter. I believe it would be wise also to make a careful search for intestinal sepsis."

The day after his return from Philadelphia the tonsils were removed, and a week later he was referred to a dentist who spent sometime cleaning up his teeth and gums.

The eye grounds returned to normal within six weeks and there was no scotoma after two months. The case has been seen yearly since that time, 1921, and there have been no signs of any return of his trouble.

Case 2.—A woman of 29, occasionally complaining of pain and stiffness of the finger joints, was found to have badly diseased tonsils and their enucleation was advised, though the advice was ignored.

Six months later the patient came, complaining of headache after prolonged near use of the eyes. She was refracted under homatropin. At this time ophthalmoscopic examination of each eye was negative. The prescription for glasses read: Right eye +1.25D⌒ +.25 C ax .75; left eye, +1.25S⌒+.50 C ax .105 and she reported in nine days that the headaches had disappeared.

Two days later she came in saying that she had no unusual symptoms until three hours before, when vision suddenly went bad in the right eye. External examination was negative. The vision was 6/200. The media were clear. Beginning at the margin of the papilla and extending one-half disc diameter beyond the fovea and covering the fovea was a large patch of white edema strongly suggesting retained nerve fiber sheath. Blood was taken for a Wassermann, which proved negative. The urine was negative. Remembering with chagrin that Dr. de Schweinitz had called attention to Jensen's disease in the other case that I and a consultant believed to be neurorentinitis, and recalling how quickly it had cleared after the removal of focal infection, I advised the patient to have her tonsils out at once. The same advice had been ignored six months previously when she complained of recurring joint pains.

She consented, and her tonsils were removed the same afternoon. The pupil was kept dilated and the eye ground examined daily.

A small flame-shaped hemorrhage, was first seen on the lower part of the patch the morning after tonsillectomy. There was no change in the appearance of the edema till the fourth day, when it seemed to be thinning out around the edges and one could recognize each day a gradual return of the normal pink reflex. By the end of a month vision had returned to 20/20. The patient never complained of discomfort and there was never any dust in the vitreous, never any signs of circumcorneal conjestion and not even a relative scotoma noticeable after one month.

It is believed that the removal of the focal infection hastened the return of the eye to normal vision.

Larsen[25] has reported a typical case with solitary lesion and sector defect recovering completely without definite symptoms of choroiditis as did this case. Possibly nature's own efforts had overcome some focal infection, as daily happens in people with myalgia, joint pains and neuritis.

CONCLUSIONS

(1) The foregoing references and these two new cases seem to accentuate the suggestion of

Verhoeff that the condition known as "Jensen's disease" has a varied etiology and that a solitary lesion and its location may be a mere accident without special significance, just as herpes labialis may exhibit a single lesion or many.

(2) In the absence of fairly definite evidence that lues or tuberculosis is present, one should remove every source of focal infection.

(3) Even though the patient is known to have tuberculosis or syphilis, it is probably wise to remove every focus of infection, because eye lesions produced by focal infection respond promptly. The delay incident to syphilis or tuberculosis treatment may cause destruction of the delicate retinal tissue.

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DISCUSSION (Abstract)

Dr. H. Moulton, Fort Smith, Ark.—A case of Jensen's disease is essentially a case in which there is an inflammatory exudation close to the papilla, associated with a scotoma extending from the blind spot to the periphery. It has been suggested that a better term would be "retino-choroiditis juxta-papillaris." That term would be correct if in all cases of retino-choroiditis juxta-papillaries the scotoma extended to the periphery. This does not exist in all cases in which the lesion is found close to the papilla, and I think it is better to retain the name, Jensen's disease.

In 1915, I observed a case of retino-choroiditis which was located as a single lesion close to the papilla. I read the field several times and never could detect extensive scotoma. The patient was a woman beyond fifty who complained that a few days before she came to see me she had had floating specks before her eye, which came on rather suddenly. Examination showed an exudate fully one disc diameter above the papilla, yellowish white and muddy looking on its surface. There were floating opacities in the vitreous. The vision was slightly dimmed, but the field of vision was interfered with below the blind spot only to the extent of about ten degrees, about what you would expect from the size of the lesion. She received a very careful general examination for syphilis and tuberculosis which were excluded. The tonsils were apparently in perfect condition. She had had all her teeth removed.

ENDOTHELIOMA OF THE LARYNX*

By CALHOUN MCDOUGALL, M.D., F.A.C.S., Atlanta, Ga.

Endothelioma or plexiform angio-sarcoma is indeed a rare neoplasm in the larynx. Not only from the standpoint of symptomatology and diagnosis, but what is of vital interest to the patient, from the standpoint of therapeusis which brings up questions that may perplex the laryngologist. Although it is only feebly malignant, shows but little tendency to ulceration or infiltration, and infection of the neighboring lymphatic glands takes place very slowly, it is very important to make an early diagnosis to conserve the function of the larynx. It is a cancer and demands a complete removal of the diseased tissue.

Case I.—A male student, 17 years old, was seen June 4, 1924, complaining of slight hoarseness and difficulty in breathing which had existed for the preceding four years. These symptoms had gradually increased until now he had to make a special effort at each inspiration of air. His voice was very high pitched and grating. He breathed with difficulty, and when asleep often became very cyanotic, awoke and sat up in bed in order to breathe. His family history was negative. He had had the usual diseases

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Nineteenth Annual Meeting, Dallas, Tex., Nov. 9-12, 1925.

of childhood. He had never had diphtheria, scarlet fever or a foreign body in the throat or larynx. His adenoids and tonsils were removed three years previously, two nasal operations have been done in the preceding two years in an attempt to relieve the present symptoms.

He was a very small and undeveloped boy, apparently bright mentally. When he talked his voice was very peculiar, and different from that of a boy approaching puberty. It had a constant high pitched, somewhat muffled grating sound. A special effort had to be made at each inspiration.

The heart, lungs, abdomen and kidneys were normal. The Wassermann was negative. The eyes and ears were normal. The nasal septum was deviated to the right. There was adhesion of the left side of the septum to the middle turbinate. The anterior tip of both middle turbinates had been removed.

The tonsils and adenoids had been removed. There was a good deal of scar tissue in the region of the tonsil pillars. The soft palate was drawn down on both sides.

Indirect laryngoscopy showed a large bluish mass below the epiglottis filling the larynx, obstructing a view of the vocal cords. An elevated mass of tissue was noticed on the left hypo-pharyngeal wall about 2 c.c above the laryngeal tumor.

On June 5, 1924, at Wesley Memorial Hospital the patient was given a general anesthetic for direct laryngoscopic examination. He became cyanotic several times while taking the ether. As he reached the third stage of anesthesia he stopped breathing and became very cyanotic. We immediately did a low tracheotomy, inserted a tube, gave artificial respiration and in a few minutes he breathed freely.

A laryngoscope was introduced into the mouth and a firm sessile tumor could be seen on the left hypopharyngeal wall, just above the larynx, about six mm. in diameter. A large grayish tumor, cherry sized, protruded from the larynx. It was soft like a polypus but not pendunculated, attached to the left ventricle.

The laryngeal tumor was completely excised with a laryngeal knife and it bled surprisingly little. The area was cauterized with a strong solution of silver nitrate. The patient recovered from this operation rapidly, breathed well through the tracheotomy tube and slept soundly at night for the first time in six months. A week later with direct laryngoscopy we removed a large section of the pharyngeal tumor under local anesthesia.

On June 19, 1924, the tracheotomy tube was removed and the opening closed. The patient breathed well through the larynx.

Examination on July 5, 1924, showed no evidence of a laryngeal tumor and the size of the pharyngeal elevation was greatly reduced. The voice sounds were normal and the boy's color was much improved. He was discharged from the hospital and returned to his home in south Georgia.

The pathologist's report was as follows:

Fig. I.—Medium magnification. Section of a tumor shows normal epithelium, dense connective tissue beneath and masses of round cells separated by blood sinuses. These cells are mesoblastic or young connective tissue cells.

Fig. II.—Medium magnification. Section of tumor shows that the epithelial surfaces are thickened and sub-epithelial structures are composed of dense fibrous connective tissue with very small areas of lymphocytic infiltration. In the specimen there is a circumscribed area surrounded by connective tissue which consists of masses of small poorly staining cells with large numbers of red blood cells, connective tissue fibers and lymphocytes interspersed. There are few hemorrhagic areas and dilated capillaries in the surrounding tissue. This section shows a more advanced stage as there is such a proliferation of fibroblasts that the tumor cells are squeezed into small groups.

The diagnosis made from these sections is endothelioma and chronic inflammatory tissue.

On Sept. 22, 1924, the patient returned to my office looking much better. He had gained seven pounds and felt better than he had in years. During the preceding week he had been snoring in his sleep for the first time since the tumors were removed. Direct laryngeal examination showed that the pharyngeal tumor had grown larger and contained a few dilated blood vessels. Also there was a small bleb-like tumor in the larynx at the same place as before. X-ray therapy was advised and treatments were given on Sept. 24, Oct. 6, and 27, and Dec. 8. At this time examination showed that the tumors had entirely disappeared.

The patient had gained twelve pounds and felt normal in every way. Subsequent examinations made in March, June and September, 1925, showed no recurrence of the disease. The patient will be kept under observation for a long time.

Endothelioma must be differentiated from simple and cavernous hemangioma, varix, submucous hemorrhage, angio-fibroma and vascular tissue which occurs in the larynx. The cell nests of this rare neoplasm are formed by a proliferation of endothelial cells. The tumor is highly vascular, due either to pre-existing or newly formed vessels, the walls of which become thicker until at length the intra-vascular spaces are entirely filled.

Endotheliomata occur in the arachnoid and pia mater, and usually on serous surfaces but have been observed in the viscera, bone, mamma, and subcutaneous tissues. The parotid neoplasm known as "mixed tumor," is often an endothelioma. Endotheliomata not uncommonly assume a distinctly aveolar type. The large flat endothelial cells springing from the serous surface, and occurring within distinct alveoli formed of connective tissue, afford a picture so closely resembling carcinomata that accurate differentiation seems at times impossible. The shape, arrangement and character of the cells, associated with the poor development of blood vessels, point conclusively to the diagnosis of sarcoma.

Endotheliomata grow slowly, as a rule, manifest metastasis late, if at all, and show little tendency to recur if they are thoroughly re-

moved. The high mortality from endothelioma is due to inaccessibility of the tissues ordinarily involved. The etiology is unknown.

DISCUSSION (Abstract)

Dr. John T. Crebbin, New Orleans, La.—Dr. McDougall is to be congratulated upon this case and the fortunate termination.

The exciting cause is not known, although it is thought that long continued irritation and inflammation are predisposing factors.

At any rate, continued hoarseness in children and adults after the fortieth year of life, which gradually grows worse, should be looked upon with considerable suspicion.

A diagnosis is difficult to make, consequently we must rely upon the laboratory for help. We should bear in mind that epitheliomata are more common than sarcomata.

Statistics show that more young adults are affected than was previously considered.

These growths develop slowly and secondary glandular involvement appears later.

An early and complete removal of these growths should be made and this should be followed with deep x-ray therapy.

Dr. I. D. Kelley, Jr., St. Louis, Mo.—This case probably represents the first report of an endothelioma involving the larynx. It brings to our attention a type of neoplasm considered by the pathologist often the most difficult tumor to diagnose correctly.

I surveyed the literature on this subject for the past ten years in an effort to find reported such a tumor in the larynx. Not only were there none, but reports of endothelioma in the upper respiratory tract were extremely rare. Two cases of endothelioma of the naso-pharynx were reported in 1921, an endothelioma or sarcoma of the trachea in 1918, an endothelioma removed bronchoscopically from the bronchus by Jackson in 1917; and finally an endothelioma of the naso-pharynx cured by radium in 1916.

The reasons why endothelioma are so interesting to the pathologists and are found so difficult to diagnose are that physiologically, endothelial cells from which this tumor is derived, have an established position intermediate between epithelium and connective tissue, and the general pathology of endothelium clearly illustrates dual tendencies. Some of the cells show epithelial qualities, others show certain potencies of connective tissue cells. In other words, these cells are intermediate between epithelium and fibroblasts.

Again, endothelium which is of mesenchymal origin, is closely related to connective tissue and explains its resemblance en masse, to connective tissue tumors, while tumors made up of serous endothelium show carcinomatous rather than sarcomatous tendencies. Lastly, vascular endothelium in inflammation proliferates readily, forming collections or groups of cells resembling endothelioma or carcinoma. In inflamed lymph nodes one finds remarkable grades of endothelial proliferation, as for example in chronic lymphadenitis, probably of tuburculous origin, cell hyperplasia occurs closely resembling or actually merging into neoplasms. With this explanation it is evident how difficult it is for pathologists to differentiate endothelioma from sarcoma, lymphosarcoma and carcinoma, together with certain embryonal tumors. Until Waldyer established the epithelial origin of carcinoma, many carcinomatous tumors were supposed to originate from the endothelium of lymph spaces and vessels. Even now many authors still classify endothelial tumors with sarcoma.

Endotheliomata, arising as they do from small vessels or lymph spaces, characteristically invade the surrounding tissue through pre-existing channels as lymph vessels and spaces, and do not split up the tissue as do carcinoma and epithelioma. Golgi was the first to introduce psammoma or sand tumors of the dura mater as endothelioma, and this tumor is recognized as the standard type of growth. Characteristic and consistant cell findings in these tumors are pavement or cylindrical endothelium, giant cells, pigment, hyalin degeneration and calcification. Depending upon the cell arrangement, they are classified as: interfascicular, alveolar, plexiform, perivascular, diffuse and miscellaneous. Their growth is said to be slow but progressive, and these tumors are notable for their multiplicity and persistant local recurrence due to their infiltrating character. Each recurrence shows an increased capacity for growth and changes in character, encouraging a complete removal of the organ in which the tumor is situated, and not merely extirpation of the tumor. Important evidence as to endothelioma may be furnished by the location, especially when multiple tumors develop in the lymph nodes, bone marrow or in any tissue not containing epithelium.

If it is so difficult to diagnose endothelioma, the question arises in my mind, because the history and pathological report of Dr. McDougall's case shows so little that is characteristic of this tumor, whether or not we are here actually dealing with an endothelioma, or simply with some vascular type of inflammation. Ewing urges that the diagnosis of endothelioma should be accepted only when the evidence is clear and conclusive, otherwise this group of tumors will continue to represent the resting place of miscellaneous tumors on which data and study has been inadequate. It cannot be too strongly urged that if our reference literature is to possess any real value, it is important that tumor diagnosis should be beyond question. In this case, particularly, we are dealing with a condition so rare and the diagnosis of the tumor itself can be so easily questioned, that it becomes imperative to have the opinion of a recognized authority on pathology before it is definitely established.

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DR. M. Y. DABNEY, Editor
C. P. LORANZ, Secretary-Manager

VOL. XIX APRIL 1926 No. 4

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twentieth Annual Meeting
Atlanta, Georgia, November 15-18, 1926

HYPERTONIC SOLUTIONS IN THE TREATMENT OF ACUTE POLIOMYELITIS

One of the effects of intravenous injection of comparatively small quantities of hypertonic solutions into the blood stream is to remove fluid from the body tissues, especially from the cerebrospinal fluid. This causes a fall in cerebrospinal fluid pressure, and a simultaneous rapid decrease in brain volume.[1] The same effect is obtained if hypertonic solutions of sodium chlorid, glucose, or magnesium sulfate, for example, are taken into the gastrointestinal tract.[2] Since this phenomenon was first reported in 1919, it has attracted considerable attention in the clinical world, particularly in the field of brain surgery. Cushing, Haden, Sachs, and others have used hypertonic solutions to advantage in the treatment of selected types of brain injury. During a craniotomy for brain tumor, according to Dowman,[3] where one hesitates to open the dura for fear of cortical rupture, intravenous injection of 50-100 c.c. of 20-30 per cent sodium chlorid may deplete the fluid within the ventricles so rapidly that the brain will visibly drop away from the dura before the surgeon's eyes.

In cases of head injury where there is danger of increasing pressure, hypertonic solutions may be used prophylactically, and if the pressure has risen to an alarming extent, it may be lowered with marked relief of symptoms. Reduction after the use of hypertonic sodium chlorid is rapid but transient, and is followed by increase, both of brain size and of cerebrospinal fluid pressure to a greater height than before. If magnesium sulfate by mouth is used instead of sodium chlorid, there is a slower fall of pressure, but one which is more permanent. Intravenous magnesium sulfate may at times be injected, but its effect upon the respiratory centers must be taken into account. Sodium chlorid in the veins first abstracts water from the tissues, reducing edema, then itself diffuses into them, becomes fixed, draws more water into them, and an increased edema results. Because magnesium sulfate does not diffuse into the tissues, its effect in reducing brain volume is more enduring.[3]

Aycock and Amoss, in 1923,[4] reported experimentation with monkeys, and one human case of acute poliomyelitis treated with hypertonic solutions and human convalescent serum. Their theory was that since in poliomyelitis an inflammatory edema surrounds the injured brain areas, the increased pressure from this on nervous tissues perhaps largely is the cause of paralysis in the acute stage, and that if the pressure is relieved temporarily during an acute stage, the severity of the condition may abate and the life of the patient may be saved. In a desperately ill case, they injected hypertonic Ringer's solution into the blood stream and convalescent human poliomyelitis serum into the spinal canal simultaneously, and the case recovered.

1. Weed, L. H., and McKibben, P. S: Presure Changes in the Cerebrospinal Fluid Following Intravenous Injections of Solutions of Various Concentrations. Am. J. Physiol., 48, p. 512, May, 1919.
2. Foley, F. E. B., and Putnam, T. J.: Effect of Salt Ingestion on Cerebrospinal Fluid Pressure and Brain Volume. Am. J. Physiol., 53, p. 464, 1920.
3. Dowman, C. E.: Hypertonic Solutions, with Particular Reference to Magnesium Sulfate, and Its Value in Certain Types of Brain Injury. S. M. J., 18, p. 351, May, 1925.
4. Aycock, W. L., and Amos, H. L.: Treatment of Acute Poliomyelitis. J. A. M. A., 81, p. 474, Aug. 11, 1923. Quoted by Smith (q. v. i.).

Smith,[5] more recently, reports injection of hypertonic sodium chlorid without serum into the vein of an apparently dying child, with subsequent recovery. He considers that probably the life was saved by this measure. There was a reaction to the injection, which he thinks was due to the toxic effect of the sodium ion. He was advised that calcium should have been added to the solution to counteract the sodium effect.

One of the usual findings of infantile paralysis is a spinal fluid under high tension. Reducing this is, however, symptomatic treatment, and in treating symptoms of any disease, one sometimes does good and as frequently destroys a natural defense. No evidence is produced by these two cases that hypertonic solutions are useful in crises of infantile paralysis. The facts discussed will stimulate further study of the pathologic reactions to this infection.

When a patient is on the point of death, there is an almost irresistible desire on the part of both the physician and the patient's family, for therapy, and intravenous injections are most popular. Hypertonic solutions in infantile paralysis may do no harm. At the present time, the solution to be used, according to the experimental evidence above outlined, should not be sodium chlorid.

STREPTOCOCCUS ERYSIPELATIS

Erysipelas may be classed with the many diseases for which there is no specific cure. It usually goes away in time, and any therapeutic measure which has been applied is apt to receive credit for having speeded its departure. Sinclair Lewis[1] in a recent popular novel, dealing with the medical profession and medical education, causes the student, Arrowsmith, to ask the professor of materia media:

"How do they know that ichthyol is good for erysipelas? Isn't it just rotten fossil fish . . . . isn't it like the mummy dust and puppy ear stuff they used to give in the olden days? . . . . maybe a post hoc, propter hoc? Have they ever experimented on a whole slew of patients together, with controls?"

The symptoms of erysipelas are due to a streptococcus which the usual cultural and morphological methods have failed to distinguish from other streptococci. Rosenow[2] has for many years claimed that streptococci isolated from specific lesions, chorea, peptic ulcer, etc., tend to reproduce the same lesions upon injection into experimental animals. Haden,[3] confirming Rosenow, has reported production of onychia in animals by inoculation with streptococci isolated from onychia lesions. The recent work upon the streptococci of scarlet fever supports this idea.

Birkhaug,[4] among others has attempted to distinguish the erysipelas from other streptococci by agglutination reactions comparable with those used for the identification of typhoid bacilli. He cultured streptococci from 34 cases of erysipelas, injected living cultures of seven of these strains into rabbits and prepared immune sera from seven different strains of erysipelas streptococci. It was noted during the process of preparing the sera that many animals died shortly after injection of the live streptococci. The high mortality was greatly reduced, if heat-killed streptococci were injected at the same time as the living. This suggests a possible therapeutic and preventive measure.

Thirty-one of his 34 strains of erysipelas streptococci were agglutinated by all seven of the immune sera, showing that there was a close relationship among the group of erysipelas streptococci. His strains were not agglutinated by anti-scarlatinal serum, nor did streptococci from scarlet fever patients agglutinate with the erysipelas sera. Nine out of 45 strains of miscellaneous streptococci, however, eight of them from cases of nasal sinusitis and one from a

5. Smith, T. Cook: Intravenous Injection of Hypertonic Salt Solution in Acute Poliomyelitis. Am. J. Dis. Chil., 31, p. 360, March, 1926.

1. Lewis, Sinclair: Arrowsmith. New York: Harcourt Bruce and Co., 1925.

2. Rosenow, E. C.: Experimental and Clinical Studies of Focal Infection and Elective Localization. Collected Papers of the Mayo Clinic, xvi, p. 1051, 1924. W. B. Saunders Co., 1925.

3. Haden, R. L.: Elective Localization of Streptococci, page 253, this issue.

4. Birkhaug, Konrad E.: Studies on the Biology of the Streptococcus Erysipelatis. Bull. Johns. Hop. Hosp., 36, p. 248, 1925.

case of meningitis, did agglutinate with the erysipelas sera. The author concludes that it is possible to differentiate by immunological methods the group of hemolytic streptococci causing erysipelas from those responsible for scarlet fever, on the one hand; and on the other, from the large series of miscellaneous hemolytic streptococci producing a variety of pyogenic infections.

Stevens and Dochez[5] find somewhat less specificity of agglutination reactions of erysipelas sera. They conclude that erysipelas immune sera agglutinate strains from erysipelas in a higher percentage of instances than they agglutinate scarlatinal strains, and that erysipelas and scarlatinal strains form two compact groups of hemolytic streptococci, more closely related to each other antigenically than to other pyogenic strains.

For the physician, practically, this means that a specific immune serum or preventive vaccine for erysipelas is more nearly at hand than it has been in the past, and that trained bacteriological technic will be increasingly necessary in the future, in the accurate diagnosis and treatment of disease.

THE CANCER SYMPOSIUM

No year of medical history is complete without consideration of the new facts brought to light by the many workers upon the disease cancer. The year 1925 was singularly rich in this field. Experimentally, in England Gye and Barnard have done brilliant work with the Rous fowl sarcoma as a starting point. Blair Bell has studied the physiological effects of new form of colloidal lead which he hopes to use successfully in the treatment of cancer.

Montrose T. Burrows, of St. Louis, has worked further with the conditions of cell multiplication, the conditions under which growth-stimulating or growth-inhibiting substances accumulate about the cell, and the relation of these substances to the accessory foods necessary for life, the vitamins. Bloodgood, of Baltimore, has continued his statistical studies upon the prevention of cancer, early diagnosis of cancer, and classification of bone tumors. Pathological diagnosis and differentiation of grades of malignancy has progressed. Others have made practical application of these discoveries.

The American Society for the Control of Cancer has carried on its work of educating the public in the importance of early recognition of precancerous lesions, and has estimated carefully for physicians the value of announcements of discoveries in the field of cancer.

The Cancer Symposium published in this issue, page 276 to 299, describes the different lines of advance, and fully discusses their clinical worth.

5. Stevens, F. A., and Dochez, A. R.: Studies on the Biology of Streptococcus. Antigenic Relations between Strains of Streptococci from Scarlet Fever and Erysipelas. J. Exp. Med., 43, p. 379, March, 1926.

Correspondence

S. M. A. MEMBERS INVITED TO ATTEND LOUISIANA STATE MEETING

Editor, SOUTHERN MEDICAL JOURNAL:

As Chairman of the Entertainment Committee of the Ouachita Parish Medical Society for the Louisiana State Medical Society's annual meeting to be held in Monroe, Louisiana, April 15-17, we extend an invitation to the members of the Southern Medical Association en route to the Dallas meeting of the American Medical Association to stop in Monroe and enjoy the meeting of the Louisiana State Medical Society. It will break the monotony of the trip and afford a pleasant visit with us.

We have ample hotel facilities and a very pleasant city to visit, and can assure S. M. A. members a good time should they visit Monroe.

Yours very truly,
D. I. HIRSCH, *Chairman.*

Monroe, La., Feb. 15, 1926.

AMERICAN BOARD OF OTOLARYNGOLOGY

Editor, SOUTHERN MEDICAL JOURNAL:

The American Board of Otolaryngology has arranged for two examinations during the month of April, as follows:

St. Paul's Sanitarium, Dallas, Texas, Monday, April 19th, at 9 a. m.

Stanford University Medical School, Clay and Webster Streets, San Francisco, California, Tuesday, April 27th, at 9 a. m.

Applications may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

H. W. LOEB, M.D., *Secretary.*
St. Louis, Mo., March 9th, 1926.

Book Reviews

Arteriosclerosis. A Summary View. By the late Rt. Hon. Sir T. Clifford Allbutt, P.C., K.C.B., M.A., M.D., Hon. D.Sc. Oxc., Vict. and Leeds; Hon. LL.D. Cantab., Glasgow, McGill, Toronto, and St. Andrews; Hon. D.C.L., Durham; Hon. M.D., Dublin; F.R.C.P., Hon. F.R.C.P.I., F.R.S., Etc.; Regious Professor of Physic in the University of Cambridge; Fellow of Gonville and Caius College; Hon. Fellow of the New York Academy of Medicine, Royal Soc. Med., and Hunt Soc.; Etc. 108 pages. New York: Macmillan and Company.

This is a monograph by one of England's great clinicians written just before his death, in his nintieth year. It is a good summary of existing views of the subject to the knowledge of which he has made many contributions. It has likewise a charm of style which has gone out in his medical writings.

Light and Health. A Discussion of Light and Other Radiations in Relation to Life and to Health. By M. Luckiesh, Director, Lighting Research Laboratory, National Lamp Works of General Electric Company, and A. J. Pacini, Director, Department of Biophysical Research, Victor X-ray Corporation of General Electric Company. 302 pages, illustrated. Baltimore: The Williams & Wilkins Company, 1926. Cloth, $5.00.

This is a popular subject. Criticisms of the book are first, that typographical errors are rather numerous, and, second, and more serious, that facts stated are not invariably accurate. A book written for the unscientific and uncritical public should take particular pains to make no positive assertions concerning theories in dispute. To uphold their statements, the authors offer no bibliography.

The Diagnosis and Treatment of Tuberculosis of the Hip. By G. R. Girdlestone, B.M. (Oxon.), F.R.G.S., Hon. Surgeon, Wingfield Orthopaedic Hospital, Oxford; Hon. Consulting Orthopaedic Surgeon, Shropshire Orthopaedic Hospital; Hon. Consulting Surgeon, Children's Orthopaedic Hospital, Bath; Children's Hospital, Cold Ash; Savernake Hospital, Marlborough; Hon. Orthopaedic Surgeon, King Edward VII Hospital, Windsor; Etc. 94 pages, illustrated. New York: Oxford University Press. Cloth, $2.50.

This is very good and a worth while clinical monograph upon a subject which consumes much of the orthopedist's time.

Lectures on Heredity. A series of lectures given at the Mayo Foundation and the Universities of Wisconsin, Minnesota, Nebraska, Iowa, and Washington (St. Louis) 1923-24. 12mo, 250 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1925. Cloth, $2.50 net.

These are lectures to the laity by men and women who have formulated much of today's knowledge of the subject. They deal with heredity in general, heredity of sex, of acquired characters, heredity in cancer, and eugenics. For the public, and for the physician who may not have kept up with the new discoveries in this rapidly developing field, they will be agreeable reading.

A Manual of Clinical Laboratory Methods. By Clyde Lottridge Cummer, Ph.B., M.D., Associate Professor of Clinical Pathology, School of Medicine, Western Reserve University; Visiting Dermatologist, St. Alexis Hospital, and St. Vincent's Hospital, Cleveland, Ohio. Second Edition, Thoroughly Revised. 547 pages, illustrated with 169 illustrations. Philadelphia and New York: Lea and Febiger, 1926. Cloth, $6.50.

This book describes the best diagnostic procedures used in laboratories today. In addition to very good descriptions of the standard methods of examination of blood, urine, feces, and gastric contents, which are satisfactory in most books, it has full chapters upon blood chemical methods; the chapter upon immunological methods contains also a brief description of the technic of the Kahn precipitation reaction; there is a chapter upon determinations of basal metabolism, and there are numerous clear colored plates where such are needed.

It is no doubt as satisfactory, concise, and complete a work upon laboratory methods as there is on the market.

Southern Medical News

LOUISVILLE REUNION AT DALLAS

The Alumni of the University of Louisville, comprising the Alumni of all former medical schools of Louisville, are planning a big reunion dinner at Dallas, Texas, Wednesday, April 21, Adolphus Hotel, 7:00 p. m. in connection with the meeting of the American Medical Association. Dr. Chas. M. Rosser (Class of '88), Medical Arts Building, Dallas, is in charge of local arrangements, and it is requested that those planning to attend please notify him. Tickets will be on sale at the Alumni window of registration headquarters and should be secured on Monday or Tuesday if possible. A splendid program has been arranged, a feature of which will be an illustrated address by Dr. Irvin Abell, Louisville (Class of '95), President Southern Surgical Association and Kentucky State Medical Association, on "The History and Early Development of Medical Education in Kentucky." All Alumni are urged to attend.

MEDICAL VETERANS OF THE WORLD WAR

A Smoker for the Medical Veterans of the World War will be given in Dallas, Texas, on Monday, April 19, at 8:00 p. m. in connection with the meeting of the American Medical Association. Among those who have signified their intention of being present is Major-General Ireland, Surgeon General U. S. Army. All Medical Veterans of the World War are invited to attend the Smoker.

ALABAMA

The Medical Association of the State of Alabama has changed the date of its next meeting at Mobile to April 27-30.

Deaths

Dr. Thomas Edwin Reeves, Camp Hugh, aged 49, died January 19th.

Dr. James D. McGlamery, Birmingham, died in March of pneumonia.

Dr. J. H. Jones, Ragland, died March 2.

Dr. Luther L. Johnson, East Florence, died recently.

ARKANSAS

The Arkansas Medical Society will hold its next annual meeting at Hot Springs, May 18-20.

Arkansas County Medical Society has elected Dr. C. E. Park, President; Dr. J. E. Coleman, Vice-President; Dr. Homer Dickens, Secretary and Treasurer.

Drew County Medical Society has elected Dr. M. Y. Pope, President; Dr. E. R. Cotham, Vice President; Dr. A. S. J. Collins, Secretary-Treasurer.

Faulkner County Medical Society has elected Dr. G. L. Henderson, President; Dr. R. L. Dawson, Vice President; Dr. J. S. Westerfield, Secretary-Treasurer.

Hot Springs County Medical Society has elected Dr. E. T. Bramlitt, President; Dr. J. M. Williams, Vice President; Dr. W. G. Hodges, Secretary-Treasurer.

Lawrence County Medical Society has elected Dr. C. C. Townsend, President; Dr. A. J. Clay, Vice President; Dr. T. C. Guthrie, Secretary-Treasurer.

Monroe County Medical Society has elected Dr. C. H. McKnight, President; Dr. T. B. Bradford, Vice President; Dr. W. L. Boswell, Secretary-Treasurer.

White County Medical Society has elected Dr. A. G. Harrison, President; Dr. A. H. Hudgins, Vice President; Dr. Sam J. Allbright, Secretary-Treasurer.

Saline County Medical Society has elected Dr. E. A. Buckley, President; Dr. J. W. Walton, Vice-President; Dr. J. M. Philips, Secretary.

Sebastian County Medical Society has elected Dr. H. H. Smith, President; Dr. N. D. McCormack, Vice-President; Dr. J. S. Southard, Secretary; Dr. D. W. Goldstein, Treasurer.

Dr. F. L. Husbands, of Blytheville, was elected President of the Tri-State Medical Association at their annual meeting, January 28, at Memphis, Tenn.

The Section Meeting of the American College of Surgeons for the States of Texas, Arkansas and Oklahoma was held in Houston, Texas, on January 28 and 29. In the election of officers, Dr. W. F. Smith, Little Rock, was elected Chairman of the Arkansas Division, Dr. J. A. Foltz, Fort Smith, Secretary and Dr. Robert Caldwell, Little Rock, Councilor.

Dr. R. F. Darnall, Little Rock, announces the opening of Salasco Sanitarium School for exceptional children, located twelve miles from Little Rock.

Dr. P. W. Lutterloh, Dr. J. T. Altman and Dr. Charles H. Lutterloh, of Jonesboro, have announced that Dr. H. A. Stround and Dr. H. H. McAdams have been added to the staff of the recently organized Jonesboro Clinic.

Deaths

Dr. George A. Bundren, Grubbs, aged 79, died recently of valvular heart disease.

Dr. James W. Coffman, Black Rock, aged 78, died in January of pneumonia.

Dr. Charles T. Baber, Franklin, aged 61, died January 8 of cerebral hemorrhage.

Dr. Henry B. Rockwell, Little Rock, aged 70, died February 1.

Dr. William A. McHenry, Rogers, aged 66, died January 14, at St. John's Hospital, Springfield, Mo., following an appendectomy.

Dr. Charles R. Shinault, Little Rock, an Ex-President of the Arkansas Medical Society, died suddenly, after having just arrived from Honduras.

DISTRICT OF COLUMBIA

The District of Columbia Public Health Association was organized February 8th, the following officers being elected: Dr. Victor C. Vaughn, President; Drs. George M. Kober and William C. Fowler, Vice-Presidents; James A. Tobey, Secretary; W. C. Cox, treasurer. The object of the society will be research and propaganda about health conditions in Washington.

The Medical Society of the District of Columbia has announced a campaign to prevent undertakers from locating their establishments in Washington in the vicinity of physicians' office buildings. At a special meeting a resolution was adopted in which it stated that the locating of undertaking establishments in the vicinity of physicians' offices would have a most injurious and detrimental effect on the health of patients visiting those offices.

Following the passage of the Wadsworth-Hill bill, the War Department will soon begin a building program to cost more than $100,000,000 for permanent barracks and hospitals for many thousand soldiers. The Letterman General Hospital, San Francisco, and the Walter Reed Hospital, Washington, will benefit to the extent of $5,037,000.

Deaths

Dr. Henry G. Wagner, Washington, aged 81, died January 21.

Dr. Charles Alexander Pfender, Washington, aged 48, died February 17, in Boston, following an operation.

FLORIDA

The Florida State Medical Association will hold its annual meeting in Gainesville, May 3-5.

Under the management of Dr. W. W. Kirk and Mr. E. W. Moore, Diagnostic Laboratories were opened in Jacksonville in February, fully equipped for routine and special examinations pertaining to serological, bacteriological, pathological and clinical diagnosis.

There were 517 cases of smallpox in the State of Florida reported between Dec. 1, 1925, and Feb. 6, 1926, and more than 150,000 persons vaccinated. The State Health Officer requests the cooperation of every physician in the State to vaccinate.

Dade County Medical Society has elected Dr. R. O. Lyell, President; Dr. G. Rapp, Secretary; Dr. R. C. Woodard, Vice-President.

Escambia Medical Society and Pensacola Hospital Staff held a joint meeting at the Pensacola Hospital recently. The following officers were elected for Escambia County Medical Society: Dr. Herbert Bryans, President; Dr. V. R. Nobles, Vice President; Dr. Herbert Snyder, Secretary-Treasurer. Officers elected for Pensacola Hospital staff are: Dr. J. H. Fellows, President; Dr. J. H. Hoffman, Secretary; Dr. H. L. Simpson and Dr. Clarence Hutchinson; Executive Committee.

Pinellas County Medical Society has elected Dr. T. R. Griffin, President; Dr. L. A. Wylie, Vice-President; Dr. H. L. Putnam, Vice-President; Dr. O. O. Feaster, Secretary; Dr. E. Lustig, Treasurer.

Dr. Bert W. Caldwell, formerly Superintendent, University of Iowa Hospital, Iowa City, has been appointed Superintendent of the Gordon Keller Memorial Hospital, Tampa.

Dr. Walton C. Touchton has been appointed Health Officer of Avon Park.

Dr. John W. Mitchell has been appointed Health Officer of Sebring.

Dr. Harris Quillian Jones, Fort Myers, and Miss Dorothea Jo Nees, Atlanta, Ga., were married Dec. 22, 1925.

Deaths

Dr. James Elbert Pennington, Miama, aged 49, died January 30.

Dr. Louis Stinson, Hosford, died recently.

GEORGIA

The Medical Association of Georgia will hold its annual meeting in Albany, May 12-14.

Medical education is to receive a total of $4,500,000 from the $10,000,000 Expansion Fund now being raised by Emory University, Atlanta. This money will be distributed as follows: Endowment for the School of Medicine, $2,000,000; endowment for the Wesley Memorial Hospital, $2,000,000; Pathology Laboratory and Hospital Administration Building, $225,000; Nurses' Home, $200,000; completion of Chemistry Building, $75,000.

Atlanta physicians, dentists and business men have purchased a site on Peachtree Street on which it is proposed to erect a twelve-story Medical Arts Building for the use of physicians and dentists. Dr. Henry Clifford Sauls is President of the Medical Arts Building, Inc.; Drs. Jay G. Williams and M. D. Huff, Vice-Presidents; Dr. Grady E. Clay, Secretary; Dr. Hugh M. Lokey, Treasurer.

Baldwin County Medical Society has elected Dr. W. M. Scott, Milledgeville, President; Dr. E. B. Saye, Milledgeville, Vice-President; Dr. H. D. Allen, Jr., Milledgeville, Secretary-Treasurer.

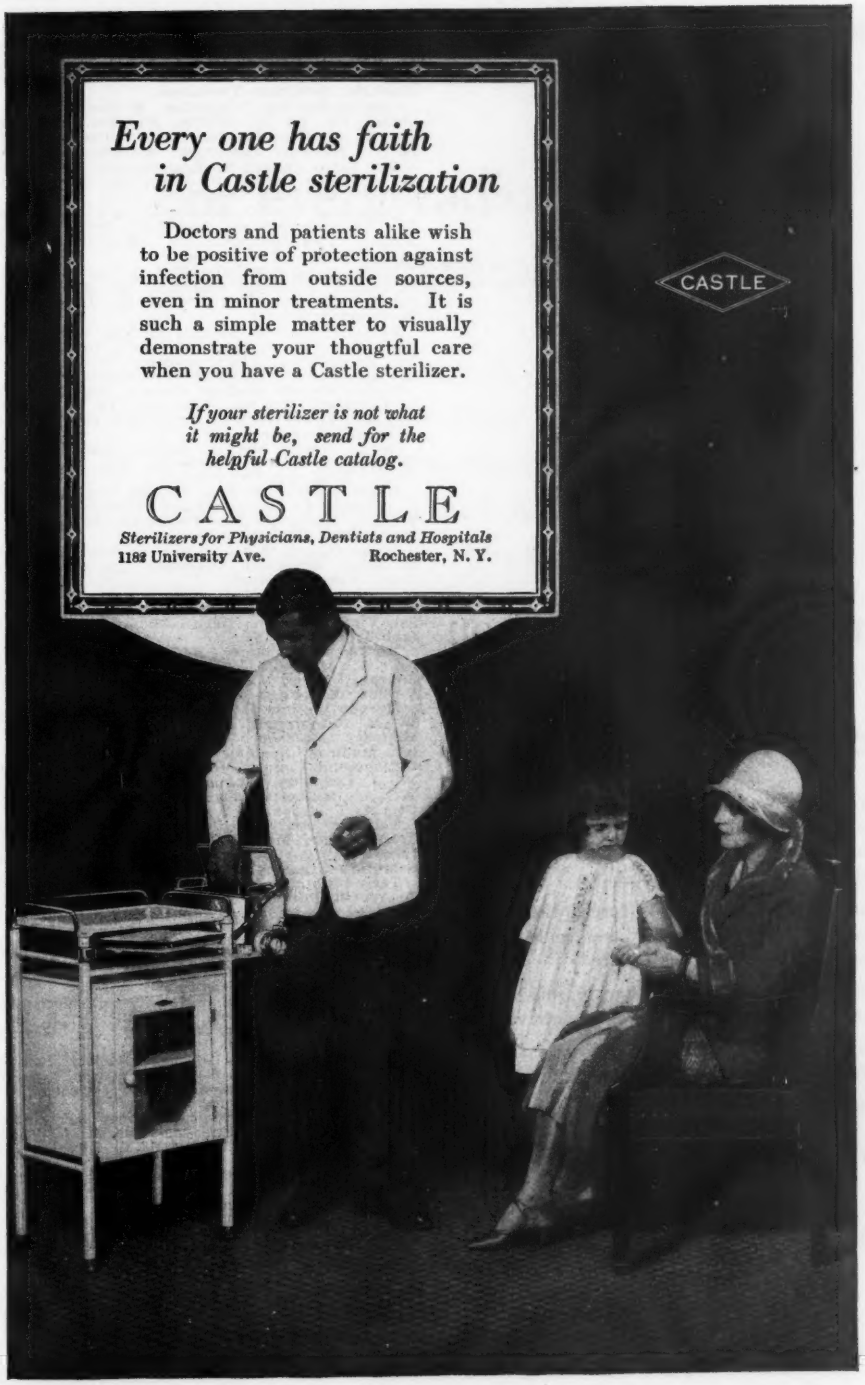
Bartow County Medical Society has elected Dr. W. E. Wofford, Cartersville, President; Dr. R. W. Wilson, Cartersville, Vice President; Dr. T. Lowry, Cartersville, Secretary-Treasurer.

Burke County Medical Society has elected Dr. W. C. McCarver, Vidette, President; Dr. H. F. Bent, Midville, Vice President; Dr. R. L. Miller, Waynesboro, Secretary-Treasurer.

Butts County Medical Society has elected Dr. O. B. Howell, Jackson, President; Dr. H. W. Copeland, Jackson, Vice-President; Dr. J. Lee Byron, Jackson, Secretary-Treasurer.

Chattooga County Medical Society has elected Dr. B. F. Shamblin, Lyerly, President; Dr. W. J. Bryant, Summerville, Vice President; Dr. H. D. Brown, Summerville, Secretary-Treasurer.

(Continued on page 34)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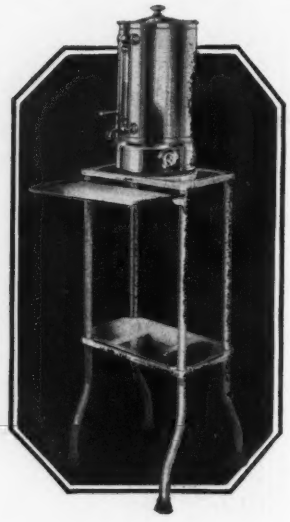

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(Continued from page 324)

Colquitt County Medical Society has elected Dr. S. M. Withers, Moultrie, President; Dr. H. T. Edmondson, Moultrie, Vice President; Dr. J. F. Covington, Moultrie, Secretary-Treasurer.

Clayton-Fayette Counties Medical Society has eleced Dr. G. W. Wallis, Fayetteville, President; Dr. T. C. Cannon, Jonesboro, Vice-President; Dr. H. D. Kemper, Jonesboro, Secretary-Treasurer.

The Crisp County Medical Society has elected Dr. W. A. Miller, Arabi, President; Dr. J. N. Dorminy, Cordele, Secretary-Treasurer.

Dougherty County Medical Society has elected Dr. J. C. Keaton, Albany, President; Dr. J. M. Barnett, Albany, Vice-President; Dr. Albert S. Bacon, Albany, Secretary-Treasurer.

Elbert County Medical Society has elected Dr. T. H. Gaines, Elberton, President; Dr. G. A. Ward, Elberton, Vice President; Dr. B. B. Mattox, Elberton, Secretary-Treasurer.

Emanuel County Medical Society has elected Dr. A. C. Johnson, Garfield, President; Dr. J. H. Chandler, Swainsboro, Vice-President; Dr. R. C. Franklin, Swainsboro, Secretary-Treasurer.

Fulton County Medical Society has elected Dr. J. L. Campbell, Atlanta, President; Dr. M. T. Benson, Atlanta, Vice-President; Dr. Grady E. Clay, Atlanta, Secretary-Treasurer.

Grady County Medical Society has elected Dr. J. B. Warnell, Cairo, President; Dr. J. V. Rogers, Cairo, Secretary-Treasurer.

Henry County Medical Society has elected Dr. J. R. Crawford, Locust Grove, President; Dr. J. B. Weldon, Hampton, Vice-President; Dr. W. P. Sloan, McDonough, Secretary-Treasurer.

Jones County Medical Society has elected Dr. J. H. Riley, Sylvester, President; Dr. J. D. Zachary, Gray, Vice President.

Jenkins County Medical Society has elected Dr. M. E. Perkins, Millen, President; Dr. Q. A. Mulkey, Millen, Vice President; Dr. C. Thompson, Millen, Secretary-Treasurer.

Montgomery County Medical Society has elected Dr. W. M. Moses, Uvalda, President; Dr. H. C. Sharpe, Uvalda, Vice President; Dr. J. E. Hunt, Mt. Vernon, Secretary-Treasurer.

Morgan County Medical Society has elected Dr. W. M. Fambrough, Bostwick, President; Dr. W. C. McGeary, Madison, Vice-President; Dr. D. M. Carter, Madison, Secretary-Treasurer.

Richmond County Medical Society has elected Dr. W. J. Cranston, Augusta, President, reelected; Dr. W. A. Mulherin, Secretary-Treasurer to succeed Dr. M. P. Agee.

Telfair County Medical Society has elected Dr. Frank Mann, McRae, President; Dr. W. H. Powell, Lumber City, Vice-President; C. J. Maloy, Helena, Secretary-Treasurer.

Terrell County Medical Society has elected Dr. J. T. Arnold, Parrot, President; Dr. R. R. Holt, Parrot, Vice-President; Dr. Logan Thomas, Dawson, Secretary-Treasurer.

Troup County Medical Society has elected Dr. Emory Parks, LaGrange, President; Dr. F. J. Amos, Hogansville, Vice-President; Dr. R. S. O'Neal, LaGrange, Secretary-Treasurer.

Upson County Medical Society has elected Dr. K. S. Williams, Thomaston, President; Dr. A. H. Black, Thomaston, Vice-President; Dr. H. A. Barron, Thomaston, Secretary-Treasurer.

Washington County Medical Society has elected Dr. B. O. Joiner, Tennille, President; Dr. R. L. Taylor, Davisboro, Vice-President; Dr. N. Overby, Sandersville, Secretary-Treasurer.

Whitfield County Medical Society has elected Dr. H. J. Ault, Dalton, President; Dr. E. O. Shellhorse, Dalton, Vice-President; Dr. B. L. Kennedy, Dalton, Secretary-Treasurer.

Worth County Medical Society has elected Dr. J. L. Tracy, Sylvester, President; Dr. H. S. McCoy, Doerun, Vice-President; Dr. W. C. Tipton, Sylvester, Secretary-Treasurer.

Eleventh District Medical Society held its thirtieth semi-annual meeting, January 12, 1926, at Douglas. Dr. P. C. Quarterman, Valdosta, was elected President; Dr. T. H. Carl, Douglas, Vice-President; Dr. W. D. Mixson, Waycross, Secretary-Treasurer.

Dr. Stewart R. Roberts, Atlanta, has been elected President of the Staff of Wesley Memorial Hospital, Emory University.

(Continued on page 36)

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Medical Division Rochester, N. Y.

(Continued from page 34)

A new $500,000 Georgia Baptist Hospital is now under construction at Atlanta.

Dr. Millard E. Winchester, former Health Officer of Thomas County, has been appointed Director of Health for the State of Georgia.

Dr. Frank K. Boland, Atlanta, was elected Vice-President of the Southern Surgical Association at its recent meeting held in Louisville, Kentucky.

Dr. E. Bates Block, a member of the Fulton County Medical Society, Atlanta, was named Honorary Grand Vice-President of the Alpha Kappa Kappa Medical Fraternity at its bi-ennial convention held in Atlanta during December.

Dr. W. E. McCurry, Hartwell, is the newly elected President of the Hartwell Kiwanis Club. He is Secretary-Treasurer of the Hart County Medical Society.

Dr. W. H. Hendricks, of Tifton, has been elected Physician to Tift County.

Dr. W. F. Reavis, of Waycross, was named Physician for Post G., Travelers Protective Association of America.

Dr. R. L. Carter was elected Physician of Thomaston, for 1926.

Mr. Alfred Bourne, of Augusta, gave $5,000 as a Christmas gift to the Department of Internal Medicine of the University of Georgia Medical College, Augusta.

Drs. Robert C. Maddox and E. J. Radcliffe have been added to the Staff of Harbin Hospital, Rome. Dr. Maddox has charge of the Pediatric Department and Dr. Radcliffe, formerly of Toronto, has charge of the Orthopedic Department.

Dr. Charles L. Ridley, Health Officer of Macon and Bibb counties, was recently elected Superintendent of the Macon Hospital, Macon, replacing Rev. C. Rebel Massenburg.

Dr. D. H. Monroe, of Emerson, Bartow County, was chosen District Health Commissioner to succeed the late Dr. Howard E. Felton.

Deaths

Dr. John Bunion Chastain, Blue Ridge, aged 68, died in January.

Dr. Albert O. Lockhart, Lumpkin, aged 57, died January 29.

Dr. Petit T. Reynolds, Monroe, aged 51, died January 10, of influenza and pneumonia.

KENTUCKY

A bill has been introduced into the State Senate which would authorize the sale of the Eastern Kentucky State Hospital, and the reinvestment of the proceeds of the sale in a new hospital plant near Lexington. The present buildings of the Eastern Kentucky State Hospital are said to be inadequate for the proper care and treatment of patients.

The Federal Board of Hospitalization has abandoned the plan of building a Veterans' Bureau Hospital at Pikesville, for which a tract of 34 acres had been purchased, the project being abandoned on the recommendation of General Hines, Director of the Veterans' Bureau.

Fayette County Medical Society has elected Dr. George H. Wilson, President; Dr. Edward J. Murray, Vice-President; Dr. E. S. Maxwell, Secretary-Treasurer.

Laurel County Medical Society has elected Dr. J. W. Crook, President; Dr. J. I. Smith, Vice-President; Dr. Oscar D. Brock, Secretary-Treasurer.

The McCracken County Medical Society has elected Dr. C. E. Reddick, President; Dr. H. T. Rivers, Vice-President; Dr. J. T. Reddick, Secretary, re-elected; Dr. P. H. Stewart, Treasurer, reelected.

Pendleton County Medical Society has elected Dr. H. C. Clark, President; Dr. J. E. Wilson, Vice-President; Dr. B. W. Conner, Secretary-Treasurer.

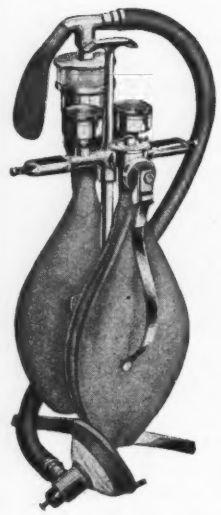
Russell County Medical Society has elected Dr. L. D. Hammond, Irvington, President; Dr. W. G. D. Flanagan, Jamestown, Vice-President; Dr. J. B. Scholl, Jabez, Secretary-Treasurer.

Dr. Robert M. Hathaway has been reelected Director of the Daviess County Health Department.

Dr. Herbert H. Hunt has been appointed City Health Officer of Mayfield.

Dr. Thomas L. Taylor, who has been Superin-

(Continued on page 38)



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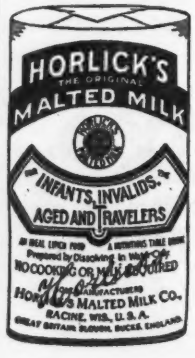

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(Continued from page 36)

tendent of the Feeble Minded Institute, Frankfort, for several years, has resigned and gone to Hawaii to be Superintendent of a territorial institution near Honolulu.

Deaths

Dr. Herman B. Oliver, Fillmore, aged 60, died January 10, at Beattyville, of carcinoma.

Dr. John B. White, Cave City, aged 76, died January 26, of cerebral hemorrhage.

Dr. James Taylor, Edmonton, aged 48, died January 24, of heart disease.

Dr. Charles H. Bateman, Bradfordsville, aged 68, died January 29, following a long illness.

Dr. James Morgan Taylor, Glasgow, aged 77, died Dec. 11, 1925, in Louisville, of senility.

Dr. Frederick A. Stine, Newport, aged 58, died February 6, of pneumonia.

LOUISIANA

The Louisiana State Medical Association will hold its annual meeting in Monroe, April 14-17. Members of other state medical associations are invited to attend Louisiana meeting en route to Dallas for American Medical Association.

At a meeting of the Louisiana group of members of the American College of Surgeons, held in New Orleans, January 25-26, the following officers were elected: Dr. Herman B. Gessner, New Orleans, Chairman; Dr. E. S. Hatch, New Orleans, Secretary; Dr. L. Abramson, Shreveport, Councilor.

More than $500,000 worth of property left by the late Mrs. Alexina Sinclair McBurney has been turned over to Charity Hospital, New Orleans.

A gift of $10,000 to the Touro Infirmary, New Orleans, in memory of the late Emanuel Sternberger, of Greensboro, N. C., is being used to enlarge the Department of Roentgenology, and to install additional equipment.

A new six-story hospital building is soon to be erected for the St. Joseph Sisters in New Orleans.

The Presbyterian Hospital, New Orleans, purchased three pieces of property on Baronne Street as a site for a medical office building.

The Soniat Memorial Hospital, New Orleans, will soon receive bids for the construction of a fifty-bed addition on Annunciation Street; this will be the first of three additions to be made to the Hospital, with a total expenditure of $1,225,000.

At the annual meeting of the Tuberculosis and Public Health Association of Louisiana, held in New Orleans, the following officers were elected: Dr. W. H. Seeman, President; Dr. H. E. Bernadas, first Vice-President; Dr. Homer Dupuy, second Vice-President.

Dr. Robert Gibbs Douglas, of Shreveport, and Miss Esther Marion Carter, of Garden City, Kansas, were married at the bride's home on February 19th.

Dr. Ernest Emile Allgeyer, New Orleans, and Mrs. Marion Gustine Clark, of Chicago, were married on February 10th.

Deaths

Dr. Joseph W. Darby, Baton Rouge, aged 51, died in January of a self-inflicted bullet wound.

Dr. Thomas J. Harrison, Montgomery, died January 28 of cerebral hemorrhage.

Dr. William Henry Weaver, New Orleans, aged 68, died February 1.

MARYLAND

The Medical and Chirurgical Faculty of Maryland will hold its annual meeting in Baltimore, April 27-29.

The Union Memorial Hospital, Baltimore, will conduct a campaign for $300,000 next October with the assistance of a committee of fifteen, the Chairman of which is Dr. John M. T. Finney. The fund will be used to furnish the Johnson Memorial Children's Hospital and Nurses' Home, to pay off a debt on the main building of the Hospital, and for general improvements.

Mr. and Mrs. Henry Walters are the donors of the first $100,000, and Mr. R. Brent Keyser, President of the Board of Trustees of the University, of the second $100,000 to the Johns Hopkins Half Century Committee, making a total of $1,358,000 col-

(Continued on page 40)

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NEW ORLEANS

(Continued from page 38)

lected. It is hoped to raise in Maryland $1,500,000.

Dr. John Girwood, Baltimore, has been appointed Medical Examiner for the Baltimore City Service Commission.

Dr. Ross McC. Chapman, Towson, is now acting President of the American Psychopathological Association, the President having resigned.

Dr. John E. O'Neill, Baltimore, has been appointed Superintendent of the negro branch of the Maryland Tuberculosis Sanatorium, Henryton, to succeed Dr. William Siegal, resigned.

The Board of Managers of the State Tuberculosis Sanatorium has ratified the appointment of Dr. John A. Smith as Superintendent of the Mount Wilson Branch which will open early this year. The new branch will be equipped to care for only women and children's ambulatory cases. A number of beds will be maintained free, as heretofore.

Dr. John Edwin Norment, Baltimore, and Miss Blanche Elizabeth Richmond, of Richmond, Va., were married January 30.

Deaths

Dr. Archibald Cunningham Harrison, Baltimore, aged 61, died January 17, of heart disease.

Dr. August C. Crothers, Havre de Grace, aged 64, died January 20, following a long illness.

Dr. William Topping Watson, Baltimore, aged 63, died February 6, at the Church Home and Infirmary, of septicemia.

Dr. Harry Cairnes Algier, Baltimore, aged 52, died January 24, at St. Joseph's Hospital, of bronchopneumonia, following a fracture of the leg.

Dr. John Henry Bolton, Baltimore, aged 85, was found dead January 25, of accidental gas asphyxiation.

Dr. John Tilghman Yourtee, Brownsville, aged 84, died January 27, of senility.

MISSISSIPPI

The Mississippi State Medical Association will hold its annual meeting in Jackson, May 11-13.

The Lower House of the State Legislature passed a bill authorizing the abandonment of the State Insane Hospital at Jackson, and the building of a new $2,500,000 institution on the Rankin County convict farm, 8 miles from Jacksonville, and to be paid for from proceeds of the sale of the present property. The construction of the new project would be supervised by a Commission comprising the Governor, the Superintendent of the Hospital, and three other members to be named by the Governor.

Central Medical Society has elected Dr. John Darrington, Yazoo City, President, and Dr. R. W. Hall, Jackson, Secretary-Treasurer.

Coahoma County Medical Society has elected Dr. James A. Slack, Friars' Point, President; Dr. J. B. Mitchell, Clarksdale, Vice-President; Dr. E. LeRoy Wilkins, Clarksdale, Secretary.

Issaquena County Medical Society has been admitted into the Delta Medical Society.

Tate County Medical Society has elected Dr. H. L. Murphy, Arkabutla, President; Dr. H. F. Byers, Senatobia, Vice-President; Dr. J. Sidney Eason, Coldwater, Secretary-Treasurer.

Tri-County Medical Society (Copiah, Lincoln, Pike, Walthall) has elected Dr. O. N. Arrington, Brookhaven, President; Dr. J. M. Catchings, Hazelhurst, Copiah County, Dr. R. E. Higdon, Brookhaven, Lincoln County, Dr. G. W. Robertson, Magnolia, Pike County, Dr. A. B. Harvey, Tylertown, Walthall County, Vice-Presidents.

At the January meeting of the American College of Surgeons in New Orleans, the following officers were elected by the Mississippi group: Dr. S. H. Hairston, Meridian, Chairman; Dr. J. C. Culley, Oxford, Secretary; Dr. T. E. Ross, Hattiesburg, Councilor.

Deaths

Dr. James Washington Gilbert, Verona, aged 80, died January 19.

MISSOURI

The Missouri State Medical Association will hold its annual meeting in St. Louis, May 17-20.

Barton County Medical Society has elected Dr.

(Continued on page 42)

CORRECTION

Constipation is dependent upon several factors. The correction of one factor is not always sufficient to cure the trouble.

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(Continued from page 40)

Thomas F. Miller, Lamar, President; Dr. John F. Cromley, Lamar, Vice-President; Dr. Wm. H. Popplewell, Lamar, Secretary.

Bates County Medical Society has elected Dr. Edward E. Robinson, Adrian, President; Dr. Gerald C. Bates, Adrian, Secretary-Treasurer.

Buchanan County Medical Society has elected Dr. C. A. Good, President; Dr. W. J. Hunt, first Vice-President; Dr. B. T. Quigley, second Vice-President; Dr. L. J. Thompson, Secretary; Dr. J. M. Bell, Treasurer.

Cole County Medical Society has elected Dr. M. R. Aldridge, Jefferson City, President; Dr. S. P. Howard, Jefferson City, Vice-President; Dr. J. A. Hill, Jefferson City, Secretary-Treasurer.

Dunklin County Medical Society has elected Dr. M. L. Cone, Campbell, President; Dr. F. W. Speidel, Senath, Vice-President; Dr. Roy Speidel, Senath, Secretary-Treasurer.

Gasconade-Maries-Osage County Medical Society has elected Dr. W. E. Johnson, President; Dr. W. R. Ferrell, Bell, Secretary-Treasurer, reelected.

Gentry County Medical Society has elected Dr. Charles H. McCaslin, Stansberry, President; Dr. George W. Whitley, Albany, Secretary-Treasurer, reelected.

The Grundy County Medical Society has elected Dr. Bertha E. Sheetz, Trenton, President; Dr. Ursa C. Weston, Galt, Vice-President; Dr. Edgar A. Duffy, Trenton, Secretary-Treasurer.

Howell-Oregon County Medical Society has elected Dr. P. D. Gum, West Plains, President; Dr. J. C. B. Davis, Willow Springs, Vice-President; Dr. R. E. Hogan, West Plains, Secretary-Treasurer.

Jefferson County Medical Society has elected Dr. J. W. Pickel, Barnhart, President; Dr. J. J. Commerford, Crystal City, Vice-President; Dr. N. W. Jarvis, Festus, Secretary-Treasurer, reelected.

Johnson County Medical Society has elected Dr. John T. Anderson, Warrensburg, President; Dr. John E. Porter, Knobnoster, Vice-President; Dr. Thomas J. Draper, Warrensburg, Secretary, reelected.

Laclede County Medical Society has elected Dr. H. A. Hamilton, Lebanon, President; Dr. J. A. McComb, Lebanon, Vice-President; Dr. J. M. Billings, Lebanon, Secretary-Treasurer.

Lafayette County Medical Society has elected Dr. Lewis Carthrae, Jr., Corder, President; Dr. R. C. Schooley, Odessa, first Vice-President; Dr. J. Q. Cope, Lexington, second Vice-President; Dr. Edmund Lissack, Concordia, Secretary-Treasurer.

New Madrid County Medical Society has elected Dr. C. S. Blackman, Parma, President; Dr. C. McRaven, Marston, Vice-President; Dr. W. N. O'Bannon, New Madrid, Secretary-Treasurer.

Newton County Medical Society has elected Dr. A. W. Benton, Neosho, President; Dr. R. L. Wills, Neosho, Vice-President; Dr. D. E. Cullers, Neosho, Secretary-Treasurer.

Phelps County Medical Society has elected Dr. W. J. Durant, Rolla, President; Dr. A. J. Walters, Rolla, Vice-President; Dr. W. S. Smith, Rolla, Secretary-Treasurer.

Randolph County Medical Society has elected Dr. M. R. Noland, Moberly, President; Dr. J. Maddox, Moberly, Vice-President, reelected; Dr. F. L. McCormick, Moberly, Secretary-Treasurer.

The eighth annual meeting of the Western Physiotherapy Association will be held in the new Hotel President, Kansas City, April 15-16, Dr. A. D. Willmoth, President, Louisville, Ky., presiding. The Western School of Physiotherapy will hold its sessions in Hotel President April 8-14.

Dr. H. McClure Young, St. Louis, was elected President of the Southwestern Branch of the American Urological Association at the meeting held in Oklahoma City, November 8. Dr. Nels Ockerbald, Kansas City, was elected Vice-President, and Dr. Clinton K. Smith, Kansas City, Secretary. The 1926 meeting will be held in St. Louis.

Dr. Jabez N. Jackson, Kansas City, was elected President of the Kansas City Clinical Society, when the annual meeting was in session on January 20th.

Dr. James W. Shankland, St. Louis, has been appointed Hospital Commissioner for the City to succeed the late Dr. G. A. Jordan.

Dr. William N. Cuthbertson, Liberty, has been appointed County Health Officer for a term of three years.

Dr. Otto B. Ilch has been reappointed Deputy State Commissioner of Health of St. Charles County for a term of three years.

(Continued on page 44)

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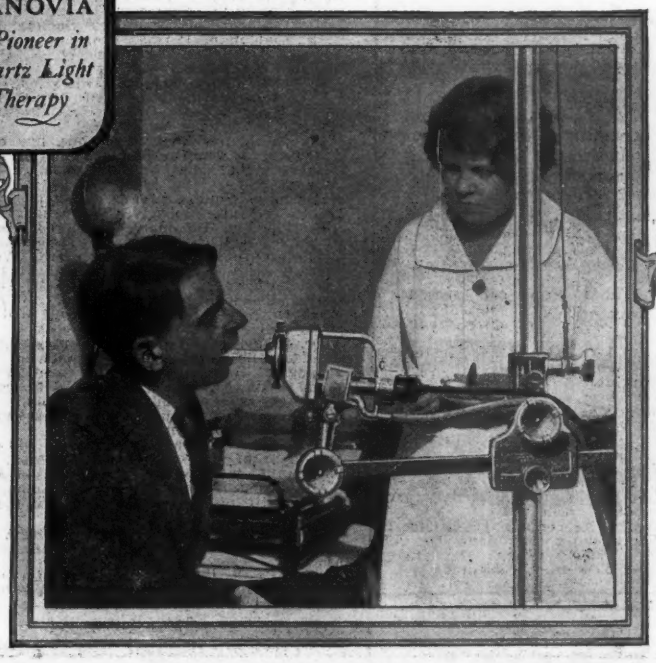

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"Hexamethylenamine"
someone else chooses for you

Formin costs no more

Merck & Co., New York

(Continued from page 42)

Dr. William W. Vandivert, Bethany, has been reappointed Deputy State Commissioner of Health for Harrison County.

Dr. Paul C. Morton, formerly of St. Joseph, has been appointed an instructor at Columbia University, New York.

Dr. Don A. Barnhart, Huntsville, has been appointed County Physician to succeed Dr. General G. Bragg.

Dr. Eugene M. Lucke, for two years Director of the Gentry County Health Department, has been appointed Health Commissioner of Marion County Health Department.

Dr. Roy R. Miller, Mound City, has been appointed Deputy State Health Commissioner and County Physician of Holt County for one year.

Dr. David C. Enloe has been appointed County Health Commissioner of Cole County to succeed Dr. Harden T. Leach.

Dr. O. R. Reynolds, Advance, has been appointed Deputy State Health Officer, and will move to Bloomfield.

Dr. Pren J. Ross, Grant City, and Miss Estelle L. McLean, of Omaha, were married on December 14, 1925.

Deaths

Dr. William Henry Hodges, Kansas City, aged 61, died in February.

Dr. William Tunis Reynolds, Kansas City, aged 55, died January 11, of complications following an appendectomy.

Dr. Charles Lewis Webster, Trenton, aged 55, died January 30.

Dr. George W. Miller, Joplin, aged 80, died January 13, following a long illness.

Dr. George Henry Hashinger, Kansas City, aged 65, died January 18, at St. Luke's Hospital.

Dr. Selustias E. Cloud, St. Joseph, aged 78, died January 17.

Dr. Tillman Howard Hunt, Albany, aged 83, died in January, at Emporia, Kansas, of uremia.

Dr. Thomas Owen Pendleton, Pilot Grove, aged 73, died in January, of heart disease.

Dr. James R. Daniel, Clarence, aged 65, died January 25, at Rochester, Minn.

Dr. Charles Edgar Wilson, Kansas City, aged 62, died January 28.

Dr. Leo F. O'Bryant, Breckenridge, died at his home October 31, 1925.

NORTH CAROLINA

The Mission Hospital, Asheville, announces a proposal to take care of the indigent of the City at $3.50 per patient daily, $5.00 for major operation service, $3.00 for minor operation service, and roentgenray service at actual cost. The Hospital has heretofore cared for the indigent in large part for $350 a month, and has incurred a loss.

In the campaign to establish a negro hospital at Greensboro, Mrs. L. R. Richardson gave $50,000, an unknown person $10,000 and citizens agreed to raise $25,000. A committee of leading physicians is also actively engaged in the campaign.

The new $150,000 Davis Hospital at Statesville, having a capacity of fifty beds, has been completed. Dr. Calvert R. Roy is the House Physician, and Dr. James W. Davis, the Surgeon.

Dr. Arthur T. Prichard has been elected President of the Board of Directors of the French Broad Hospital, Asheville.

The Medical Staff of U. S. Veterans' Bureau Hospital, No. 60, Oteen, entertained the members of the Buncombe County Medical Society at the Hospital, January 18. There was a clinic, refreshments and a social hour.

Deaths

Dr. R. Z. Linney, aged 48, Charlotte, died suddenly of apoplexy on January 20.

Dr. Thomas L. Booth, Oxford, died January 25.

OKLAHOMA

St. John's Hospital, Tulsa, of 300-bed capacity, erected at a cost of $1,500,000, has recently opened. There are now 80 beds ready for occupancy and the work is being rushed to complete the remaining part by fall.

(Continued on page 46)

The Technique of Intravenous Antitoxin Administration

Intravenous administration is indicated in severe or late cases of diphtheria. Estimate the total necessary dosage and give at once. A repeated dose should only mean that the necessary dosage was underest'mated in the first instance.

This is not true with tetanus. Here repeated intravenous injections in conjunction with intraspinal and subcutaneous injections are indicated.

Use highly concentrated, clear, antitoxin. | Remove rubber cap. | Twist paper and remove stylet at the same operation.

Slip on flexible needle connection. | Push down and rotate glass plunger to loosen seal. | Set aside syringe; avoid needle contamination.

Wipe skin with alcohol. (Note: Iodin obscures veins.) Apply tourniquet. | Grasp needle hub with right hand; support patient's arm and skin with left hand. | Insert needle, bevel down, parallel and over vein.

Enter vein one half inch from skin opening. | Release tourniquet. Inject slowly. | Apply pressure, withdraw needle, continue pressure and flex arm.

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THE CUTTER LABORATORY
Established 1897

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Los Angeles
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(Continued from page 44)

The American College of Surgeons, Oklahoma Division, at its meeting at Houston, Texas, January 28, elected Dr. W. A. Cook, Tulsa, Chairman; Dr. G. A. Wall, Tulsa, Secretary; Dr. LeRoy Long, Oklahoma City, Councilor. Next year's meeting will be held at Tulsa.

Beckham County Medical Society has elected Dr. J. E. Standifer, Elk City, President; Dr. G. H. Stagner, Erick, Secretary-Treasurer.

Blaine County Medical Society has elected Dr. George M. Holcombe, Okeene, President; Dr. H. M. Krebs, Eagle City, Vice-President; Dr. W. F. Griffin, Secretary-Treasurer.

Canadian County Medical Society has elected Dr. D. P. Richardson, Union City, President; Dr. L. G. Wolf, Okarche, Vice-President; Dr. J. T. Riley, El Reno, Secretary.

Carter County Medical Society has elected Dr. S. DePorte, President; Dr. R. C. Sullivan, Vice-President; Dr. A. G. Cowles, Secretary-Treasurer, all of Ardmore.

Cherokee County Medical Society has elected Dr. J. S. Allison, Tahlequah, President, and Dr. A. A. Baird, Tahlequah, Secretary.

Coal County Medical Society has elected Dr. J. J. Hipes, Coalgate, President, and Dr. Frank Bates, Coalgate, Secretary-Treasurer.

Craig County Medical Society has elected Dr. Louis Bagby, Vinita, President; Dr. W. R. Marks, Vinita, first Vice-President; Dr. J. L. Wharton, Ketchum, second Vice-President.

Custer County Medical Society has elected Dr. C. H. McBurney, Clinton, President; Dr. J. J. Williams, Weatherford, Vice-President; Dr. E. E. Darnell, Clinton, Secretary.

Garfield County Medical Society has elected Dr. A. E. Wilkins, Covington, President; Dr. B. S. Harris, Drummond, Vice-President; Dr. Paul B. Champlin, Enid, Secretary-Treasurer.

Garvin County Medical Society has elected Dr. W. P. Greening, Pauls Valley, President; Dr. H. P. Markham, Pauls Valley, Vice-President; Dr. James W. Stevens, Pauls Valley, Secretary-Treasurer.

Grady County Medical Society has elected Dr. U. C. Boon, Chickasha, President; Dr. W. R. Barry, Alex, first Vice-President; Dr. W. L. Bonnell, Chickasha, second Vice-President; Dr. Martha J. Bledsoe, Chickasha, Secretary-Treasurer.

Haskell County Medical Society has elected Dr. T. B. Turner, Stigler, President, and Dr. John Davis, Stigler, Secretary-Treasurer.

Hughes County Medical Society has elected Dr. W. B. Bentley, Calvin, President; Dr. H. A. Howell, Holdenville, Vice-President; Dr. D. Y. McCary, Holdenville, Secretary-Treasurer.

Jackson County Medical Society has elected Dr. W. H. Price, Eldorado, President; Dr. L. H. Hardin, Elmer, Vice-President; Dr. W. P. Rudell, Altus, Secretary-Treasurer.

Kiowa County Medical Society has elected Dr. J. M. Ritter, Roosevelt, President; Dr. B. H. Watkins, Gotebo, Vice-President; Dr. J. H. Moore, Hobart, Secretary-Treasurer for the fourth successive time.

Lincoln County Medical Society has elected Dr. W. H. Davis, Chandler, President, and Dr. J. M. Hancock, Chandler, Secretary.

Mayes County Medical Society has elected Dr. E. L. Pierce, Pryor, President; Dr. J. E. Hollingsworth, Strang, Vice-President; Dr. Sylba Adams, Pryor, Secretary.

Murray County Medical Society has elected Dr John T. Wharton, Sulphur, President; Dr. A. P. Brown, Davis, Vice-President; Dr. Howson C. Bailey, Sulphur, Secretary-Treasurer, reelected.

McIntosh County Medical Society has elected Dr. F. L. Smith, Fame, President; Dr. D. E. Little, Eufaula, Vice-President; Dr. W. A. Tolleson, Eufaula, Secretary-Treasurer.

McLain County Medical Society has elected Dr. I. N. Kolb, Blanchard, President; Dr. J. H. West, Purcell, Vice-President; Dr. O. O. Dawson, Wayne, Secretary-Treasurer.

Okfuskee County Medical Society has elected Dr. C. M. Bloss, Okemah, President, and reelected Dr. R. Keys, Okemah, Secretary-Treasurer.

(Continued on page 48)

The Management of an Infant's Diet

Mellin's Food— A Milk Modifier

A definite, comprehensive and practical system of arranging the diet for infants deprived of human milk has developed from the studied application of Mellin's Food as a means for the modification of milk.

An account of the experiences that resulted in the acceptance of the principles upon which Mellin's Food is based would be a remarkable record of a unique achievement, for from the earliest recognition of the merits of Mellin's Food to the present day—a period of sixty years—an ever-increasing number of physicians show their confidence in this system by continuing to give it their preference.

Accurate analytical work, together with all other important details necessary in perfecting this system, its rational arrangement and suggestions in relation to its application in individual conditions, are set forth clearly and concisely in a substantially-bound book, "Formulas for Infant Feeding". A copy of this book will be sent by first-class mail, postage prepaid, to any physician upon request.

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Trial tube and additional information on request.

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122 HUDSON ST. NEW YORK

(Continued from page 46)

Okmulgee County Medical Society has elected Dr. W. M. Cott, Okmulgee, President; Dr. A. J. Milroy, Okmulgee, Vice-President; Dr. G. A. Kilpatrick, Henryetta, Secretary-Treasurer.

Ottawa County Medical Society has elected Dr. Ira Smith, Commerce, President; Dr. Charles McCallum, Quapaw, Dr. H. K. Miller, Fairland, and Dr. E. Albert Aisenstadt, Picher, Vice-President; and re-elected Dr. G. Pinnell, Miami, Secretary-Treasurer.

Pittsburg County Medical Society has elected Dr. O. W. Rice, President, and Dr. F. L. Watson, Secretary-Treasurer, both of McAlester.

Pontotoc County Medical Society has elected Dr. J. L. Jeffress, Ada, President; Dr. John R. Craig, Ada, Vice-President; Dr. Alfred R. Sugg, Ada, Secretary.

Pottawatomie County Medical Society has elected Dr. J. H. Scott, Shawnee, President; Dr. R. C. Kaylor, McLoud, Vice-President; Dr. W. M. Gallaher, Shawnee, Secretary-Treasurer, reelected.

Texas County Medical Society has elected Dr. William H. Langston, President, and Dr. R. B. Hayes, Secretary-Treasurer, both of Guymon.

Wagoner County Medical Society has elected Dr. S. R. Bates, Wagoner, President; Dr. E. P. Nesbitt, Wagoner, Vice-President; Dr. C. E. Hayward, Wagoner, Secretary-Treasurer.

Medical Arts Building, Oklahoma City, has shown a profit during the past nine months of its operation of $5,000 per month, as reported at the meeting for the election of officers of the building association. All officers were reelected: Dr. J. S. Pine, President; Dr. E. S. Lain, Vice-President; Dr. R. S. Parsons, Secretary; Dr. R. M. Howard, Treasurer.

Dr. David D. Paulus, Oklahoma City, has been appointed Superintendent of the Oklahoma City Clinic and Wesley Hospital to succeed Mr. George D. Hansen, resigned.

The Oklahoma County Medical Society announces that it will establish permanent headquarters in the Medical Library of the new Medical Arts Building, Oklahoma City.

Dr. Eva Wells, Oklahoma City, has been appointed Assistant School Physician of the City schools of Oklahoma City.

(Continued on page 50)

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(Under the control of the Interior Department)

The attention of the American Medical Profession is invited to the great benefits to be derived from the use of the radio-active waters of Hot Springs in the treatment of diseases where rapid elimination is desired such as, arthritis, neuritis, malaria, affections of the skin and other diseases resulting from toxemias and microbic infection.

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LEESBURG, VA.

(Continued from page 48)

Deaths

Dr. Abraham V. Ponder, Sulphur, aged 76, died January 17, of paralysis.

SOUTH CAROLINA

The South Carolina State Medical Association will hold its annual meeting in Sumter, April 6-8.

The Sumner Hospital at Rock Hill was destroyed by fire January 25.

Dr. Lee W. Milford, Anderson, has taken up his duties as College Physician for Clemson College, succeeding Dr. George D. Heath, who held that position for several years.

Dr. Leon Banov, Charleston, County Health Officer, has taken over the duties of City Health Officer, succeeding Dr. John Mercier Green in the latter capacity, and will henceforth direct both City and County Health Departments.

Dr. James M. Beeler recently was elected Superintendent of the Spartanburg General Hospital, Spartanburg.

Deaths

Dr. John Henry Alston, Sumnerville, aged 56, died January 27 of cerebral hemorrhage.

TENNESSEE

The Tennessee State Medical Association will hold its annual meeting in Memphis, May 11-13.

The Tri-State Medical Association of Mississippi, Arkansas and Tennessee, held its annual meeting at Memphis, on January 26-28. The following officers were elected: Dr. F. L. Husbands, Blytheville, Ark., President; Dr. W. C. Overstreet, Jonesboro, Ark., Dr. T. M. Riddell, Swifton, Miss., and Dr. H. T. Collier, McKenzie, Vice-Presidents; Dr. A. F. Cooper, Memphis, Secretary-Treasurer, reelected.

Bradley County Medical Society has reelected Dr. Robert L. Bean, Cleveland, President; Dr. J. F. Gilbert, Cleveland, Vice-President; Dr. Hubert W. Harris, Cleveland, Secretary-Treasurer.

Carroll County Medical Society has elected Dr. O. W. Fesmire, Atwood, President; Dr. R. M. Elinor,

(Continued on page 52)

CLASSIFIED ADVERTISEMENTS

REPRESENTATIVES WANTED—We are about to appoint representatives in Alabama, Georgia and Mississippi to call on both physicians and dentists presenting our extensive and varied list. Immediate, permanent, well-paid work. State age and experience. Lea & Febiger, 600 S. Washington Sq., Philadelphia, Pa.

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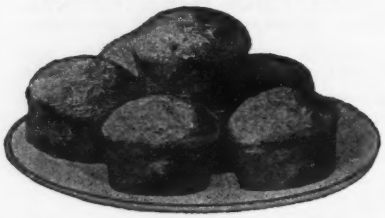

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Large Carton Flour *(30 days' supply)* $4.85

May be purchased from leading druggists or direct from

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(Continued from page 50)

McKenzie, Vice-President; Dr. E. M. Everett, McKenzie, Secretary-Treasurer.

Coffee County Medical Society has elected Dr. W. M. Wilson, Tullahoma, President; Dr. E. V. Vaughan, Manchester, Vice-President; Dr. D. H. Sneed, Manchester, Secretary-Treasurer.

Hamblen County Medical Society has elected Dr. P. L. Henderson, Morristown, President; Dr. F. F. Painter, Morristown, Vice-President; Dr. S. M. Ryburn, Morristown, Secretary-Treasurer.

Madison County Medical Society has elected Dr. Charles F. Webb, Jackson, President; Dr. Harold H. Webb, Jackson, Vice-President; Dr. Jack R. Thompson, Jackson, Secretary-Treasurer, reelected.

Monroe County Medical Society has elected Dr. S. N. Penland, Madisonville, President, reelected; Dr. H. C. Shearer, Madisonville, Vice-President; Dr. L. L. Barnes, Sweetwater, Secretary-Treasurer.

Roane County Medical Society has elected Dr. J. C. Fly, Kingston, President; Dr. W. W. Hill, Harriman, Vice-President; Dr. John Roberts, Kingston, Secretary-Treasurer.

The Memphis and Shelby County Medical Society has elected Dr. J. A. Crisler, Sr., President; Dr. Louis Levy, Vice-President; Dr. T. N. Coppedge, reelected Treasurer; Dr. A. F. Cooper, reelected Secretary, all of Memphis.

Smith County Medical Society has elected Dr. J. J. Beasley, Pleasant Shade, President; Dr. J. H. Chism, Carthage, Vice-President; Dr. B. J. High, Elmwood, Secretary-Treasurer.

White County Medical Society has elected Dr. E. B. Clark, Clifty, President; Dr. A. A. Bradley, Cookeville, Vice-President; Dr. A. F. Richards, Sparta, Secretary-Treasurer, reelected.

Wilson County Medical Society has elected Dr. R. E. Johnson, Lebanon, President; Dr. W. S. Dotson, Lebanon, Vice-President; Dr. J. R. Bone, Lebanon, Secretary-Treasurer, reelected.

Expenditure of $280,000 for the construction of the first unit in a million-dollar building program to provide for the expansion of the Medical Department of the University of Tennessee was ratified at a meeting of the Board of Trustees of the University, December 15.

Dr. S. S. Moody, formerly of Shelbyville and Louisville, Ky., has been made County Health Officer of Weakey County and has changed his residence to Dresden.

Dr. R. N. Taylor, Knoxville, has been assigned to the Infirmary of the University of Tennessee.

Dr. Cummings Harris, Memphis, for many years connected with the City Board of Health as epidemiologist, has resigned. Dr. S. L. Wadley has succeeded him.

Deaths

Dr. James J. Rucker, Overall, aged 79, died January 9, at Nashville.

Dr. Samuel Benjamin Fowler, Hendersonville, aged 72, died January 18, at a hospital in Nashville.

Dr. Joseph L. Clark, Jonesboro, aged 74, died January 10.

TEXAS

The Texas State Medical Association will hold its annual meeting in Houston, May 24-27.

(Continued on page 54)

TULANE UNIVERSITY OF LOUISIANA
Graduate School of Medicine

This school has been reorganized to meet the requirements of the Council on Medical Education of the A. M. A. New men have been added to the Faculty in every department. Advanced studies leading to higher degrees in every branch of medicine, beginning Sept. 22, 1925. Short review courses of six weeks each for busy practitioners beginning Nov. 2, 1925. We believe physicians can get as good opportunities here as the country affords, while enjoying a mild climate and the hospitality of one of the most interesting cities in America. For information address

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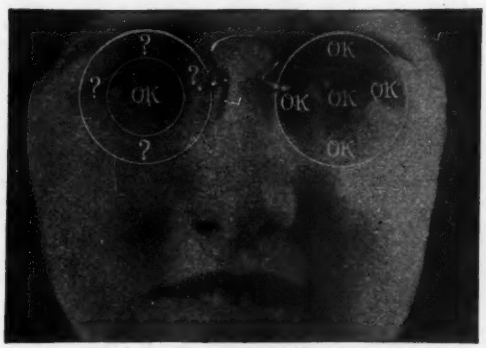

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Also in 5 cc bulk vials.

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Manhattan Eye Salve Company

Louisville, Kentucky.

(Continued from page 52)

Cotton Belt Surgeon's Association has elected Dr. Jno. S. Turner, Dallas, President; Drs. Louis Abramson, Shreveport, La., Wm. H. Morehead, Stuttgart, Ark., G. S. Cannon, Fornfelt, Mo., and C. Joyce, Fort Worth, Tex., Vice-Presidents; Dr. William Hibbits, Texarkana, Ark., Secretary-Treasurer.

Erath County Medical Society has elected Dr. J. R. Sessums, Dublin, President; Dr. T. F. Bryan, Dublin, Secretary.

Gonzales County Medical Society has elected Dr. J. J. Flouts, President; Dr. A. B. Parr, Vice-President; Dr. W. T. Dawe, Secretary-Treasurer, reelected.

Harris County Medical Society has elected Dr. James Greenwood, President; Dr. F. J. Slataper, Vice-President; Dr. J. C. Michael, Secretary; Dr. J. E. Alexander, Treasurer.

Hidalgo County Medical Society has elected Dr. J. G. Webb, Mercedes, President; Dr. J. W. Conard, Pharr, Vice-President; Dr. J. R. Mahone, Pharr, Secretary-Treasurer, reelected.

Johnson County Medical Society has elected Dr. J. D. Osborn, Cleburne, President; Dr. C. L. Edgar, Cleburne, Vice-President; Dr. M. Dennis, Cleburne, Secretary-Treasurer.

Medina-Uvalde-Maverick-Val Verde-Edwards-Real Counties Medical Society has elected Dr. W. H. Smith, Hondo, President; Dr. S. B. Hudson, Sabinal, Vice-President; Dr. A. J. Springfield, Leakey, Secretary-Treasurer.

Twelfth District Medical Society has elected Dr. O. F. Gober, Temple, President; Dr. Doyle L. Eastland, Waco, Secretary-Treasurer, reelected.

Wise County Medical Society has elected Dr. W. L. Russell, Rhome, President; Dr. R. T. Spencer, Bridgeport, Vice-President; Dr. S. J. Petty, Decatur, Secretary-Treasurer.

Baylor Medical Alumni met at Dallas and elected the following officers: Dr. Ben R. Buford, President; Dr. Cyrus Janison, Vice-President; Dr. W. F. Pickett, Secretary-Treasurer.

Through the aid of the Lion's Club, the cooperation

(Continued on page 56)

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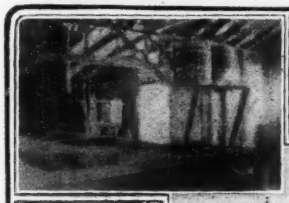

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(Continued from page 54)

of most of the physicians and dentists of Cleburne has been secured in the establishment of a free clinic for the school children of the City.

Dr. John S. Christian, who has been connected with the Austin State Hospital, Austin, for the past three years, has accepted the superintendency of the State Hospital for Senile Insane, Austin.

Dr. Frank C. Scott and Miss Doris E. Laudan, both of Waco, were married November 11, 1925.

Deaths

Dr. Thomas G. Calhoun, Tenaha, aged 55, died January 23, of injuries received in an automobile accident.

Dr. Pryor Lea Shelton, Plemons, died in November, 1925.

Dr. Allen George Heard, Houston, aged 44, died January 21, of pneumonia.

Dr. William E. P. Tims, Ennis, aged 62, died February 4, of cerebral hemorrhage.

Dr. Amos Clark Walker, Fort Worth, aged 74, died January 13.

Dr. Josiah H. Payne, Columbus, aged 73, died November 26, 1925.

Dr. W. Augustus Allen, Silver Lake, aged 84, died January 5.

Dr. G. H. Richardson, Claude, aged 78, died at Brownwood, December 22, 1925.

Dr. R. M. Munroe, Temple, died recently.

VIRGINIA

The Shriners have purchased a lot of approximately nine acres in Richmond, on which to erect the proposed hospital for crippled children. This is to cost about $500,000, and it is expected work will be started on it during next summer.

An improvement made in the Petersburg, Virginia, Hospital was that of a well-equipped seven-room maternity department. The medical members of the Board of Directors who submitted this report are Drs.

(Continued on page 58)

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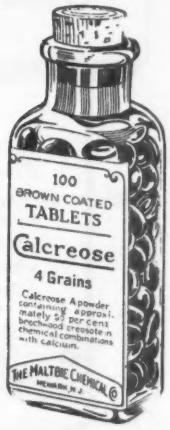

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(Continued from page 56)

Mason Romaine, Wright Clarkson and John M. Harwood.

Dr. Edward D. Davis, Winchester, but formerly of Harrisonburg, has been elected President of the Newtown Giant Incubator Corporation.

Dr. R. L. Mason, Roanoke, was recently elected Chairman of the Board of Trustees of Roanoke Lodge No. 197, Benevolent and Protective Order of Elks.

Drs. B. R. Hudnall, E. R. Rogers and J. V. Jordan, all of Covington, have been appointed members of committees in the Kiwanis Club of that place for the coming year.

Mrs. William Morgan Smith, of Clarke County, was recently appointed a member of the State Board of Health to fill the unexpired term of her husband, who died the latter part of December.

Dr. W. W. Wilkinson, La Crosse, was reelected Vice-President of the Bank of La Crosse, at its annual meeting in January.

Lt. Com. Micajah Boland, M. C., U. S. N., who spent November and December at the New York Post-Graduate Medical School taking a special course in physical diagnosis, has resumed his duties at the Naval Operating Base, Hampton Roads.

The Rose Van Vort Restorium has been opened on Three Chopt Road, just outside the City limits of Richmond, for the care of the convalescent and chronic patients and those in need of a rest cure. Miss Rose Zimmern Van Vort has associated with her in this work Miss Frances Calisch.

At the annual meeting of the Saltville Savings Bank, Dr. Thomas K. McKee was elected President, and Dr. E. A. Holmes, Vice-President for the coming year.

Dr. Hugh T. Nelson, Charlottesville, was elected Vice-President of the Redland Club of that City, at its annual meeting held in January.

Arlington County Medical Society has elected Dr. Henry A. Hornthal, Potomac, President; Dr. B. H. Swain, Ballston, reelected Secretary-Treasurer.

Bedford County Medical Society has elected Dr. W. O. McCabe, Thaxton, President; Dr. J. A. Rucker, Bedford, Secretary.

The Richmond Ophthalmological and Oto-Laryn-

(Continued on page 60)

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REFERENCES ON CAPROKOL

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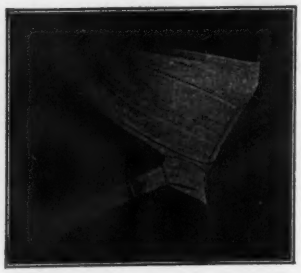

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(Continued from page 58)

gological Society has elected Dr. B. R. Wellford President; Dr. A. F. Bagby, Vice-President; Dr. F. H. Lee, Secretary-Treasurer.

The Richmond Pediatric Society has elected Dr. St. George T. Grinnan, President; Dr. J. B. Stone, Vice-President; Dr. Henry Stern, Secretary-Treasurer.

Dr. Gerald A. Ezekiel, Richmond, and Miss Julia-May Sommers, of Washington, D. C., were married February 22.

Deaths

Dr. George Grattan Painter, Pulaski, aged 68, died January 23, following a long illness.

Dr. James Marvin Prichard, Olinger, aged 74, died January 9.

Dr. Edward Roland Hart, Suffolk, aged 46, died January 22.

Dr. John Randolph, Arvonia, aged 67, died recently.

Dr. John R. Atwell, Wicomico Church, died in Washington, D. C., January 6.

WEST VIRGINIA

The West Virginia State Medical Association will hold its annual meeting in Morgantown, May 25-27.

Dr. Thomas W. Moore was elected President, Dr. Oscar B. Biern, Vice-President, and Dr. F. O. Marple, Secretary-Treasurer, all of Huntington, of the Tri-State Medical Association, organized in Huntington January 21, when more than 300 physicians and surgeons from West Virginia, Ohio and Kentucky convened. The Board of Directors include the names given and Dr. Gilbert Nicklewaite, of Portsmouth, Ohio, and Dr. A. H. Winans, of Ashland, Ky.

Dr. J. Howard Anderson, Marytown, who has been active in the State Medical Association for many years, has accepted a place on the Board of Trustees of the proposed new Kanawha University, which is to be located in Charleston.

Dr. Frank Carroll has been appointed Oral Surgeon on the North Wheeling staff.

Deaths

Dr. Irvin Hardy, Morgantown, aged 52, died February 3, at the Western Pennsylvania Hospital, Pittsburgh, of heart disease.

THE STANDARD

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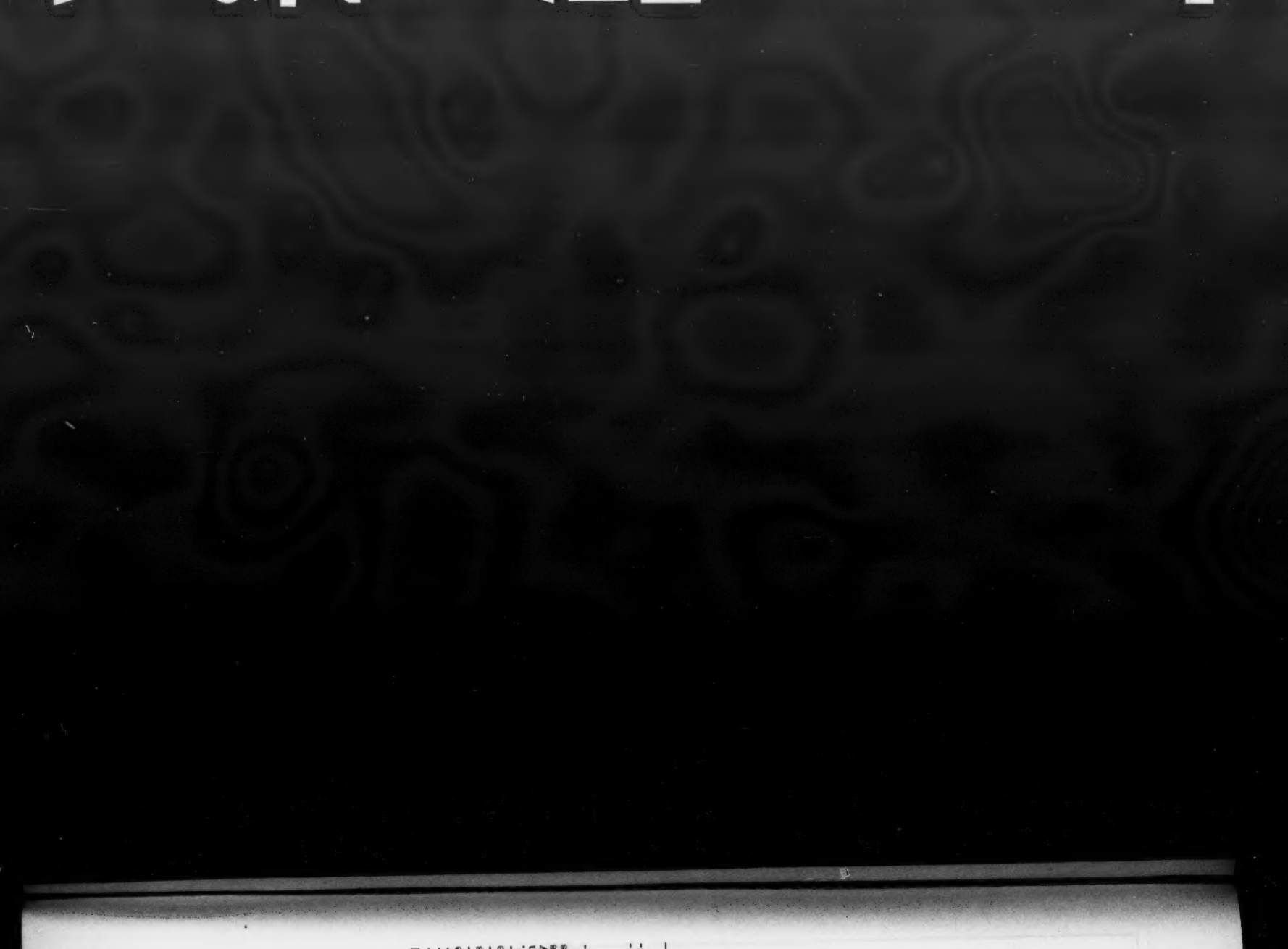

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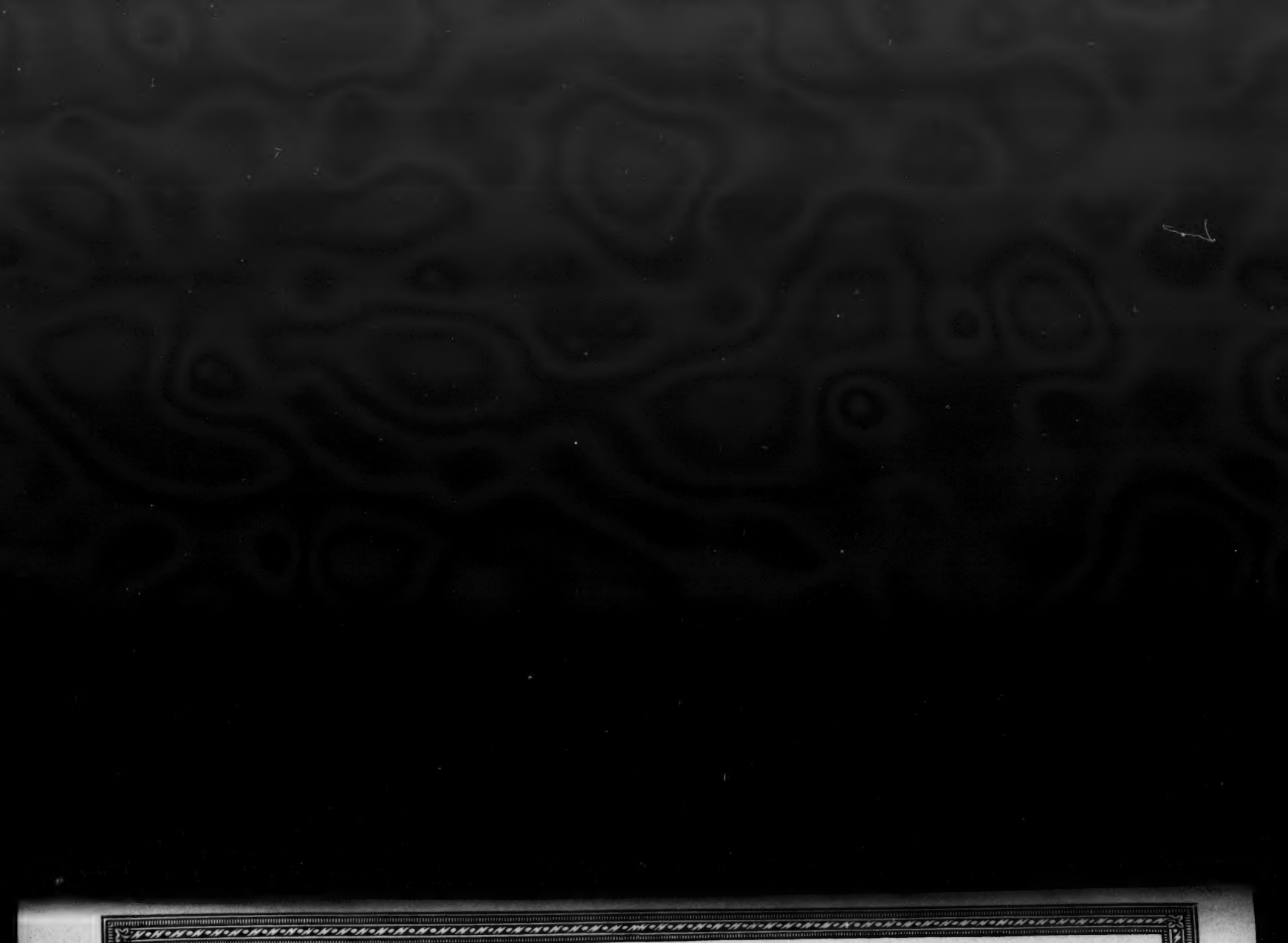
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